MIDWEST ENGINEER

WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

SERVING THE ENGINEERING PROFESSION

Television's Future — New TV Network — Fluidization of Coal

VOL. 1 JANUARY, 1949 NO. 5

MIDWEST ENGINEER

1948-49 Yearbook Edition

In past years the Yearbook of the Western Society of Engineers has been a pocket-size publication containing the names of the members of the Society and other pertinent data. Advertising has been in the back of the magazine.

Beginning this year, the Yearbook will be the same size as MIDWEST ENGINEER and will use a similar format. Ads will be interspersed throughout the pages. Advertising rates are the same as for the MIDWEST ENGINEER—a real bargain for space in a permanent reference book used frequently throughout the year by all WSE members.

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Serving the Engineering Profession

January 1, 1949 — Vol. 1, No. 5

Contents

COVER CREDIT

Microwave radio relay tower at Lake Zurich, Illinois, which picks up television and long distance telephone impulses from a transmitter atop the Franklin Building, Chicago, and relays them on to Milwaukee. This is one link of the Bell System's Midwest network which will be joined with the East Coast network beginning January 12. Photo, courtesy Illinois Bell Telephone Co.

COMING IN THE FEBRUARY ISSUE:

SOIL SOLIDIFICATION

FOOD PACKAGING METHODS

TALKING TO THE EMPLOYEE

Letters

TO THE EDITOR

MIDWEST ENGINEER welcomes contributions for this column, whether comments, criticism, or opinions.

E. L. Archibald Company
79 West Monroe St.
Chicago 90, Ill.

November 20, 1948

Mr. Verne O. McClurg
Mundie Jensen & McClurg
Dear Mr. McClurg:

Just a few lines to let you know how much I have enjoyed the infant MIDWEST ENGINEER, of which I have read Volume I, Numbers 1, 2 and 3.

My thoughts as to why this publication has been so interesting: Articles varied enough of subjects we are interested in but not actively engaged enough in to keep abreast of detail progress. Articles written incorporating a little history, plus a bit of romance, together with some condensed technical.

Taking the opportunity of expressing a hope that the infant will grow to maturity with a continuation of health during formative years, together with best of wishes to the founders, I remain

ROBERT E. ARCHIBALD

In the December MIDWEST ENGINEER an invitation to the Women's Council meeting on December 9 was extended to all members. Miss Iris Ashwell was the speaker, and her subject was "City Planning." I attended the meeting.

I had two objectives. I desired to hear the lecture. Also, I was curious to see how the new section was operating.

What I learned, I believe, was of great value to the Society. They had brief minutes of the previous meeting and discussion of the speaker and subject of the next meeting. Then every new attendant was given an opportunity to introduce herself, and an attendance roll was passed around for record to give the attendants' affiliations. A feeling of social welcome put everyone at ease.

The lecture was of great interest, and the question period animated and generally supplied information that broadened the scope of the lecture and satisfied the special interests of those present.

I believe the ladies have created a formula for sectional meetings which should be adopted by all sections instead of the old formula which usually sends us home without meeting a new acquaintance, or assimilating the valuable lecture information to our individual interests.

Very truly yours,
PERCY SAWYER

Engineering Societies Personnel Service, Inc.
Chicago Office

October 19, 1948

Mr. V. O. McClurg
Western Society of Engineers
Dear Mr. McClurg:

I am in receipt of a letter from Mr. Alfred H. Meyer, Executive Director, Engineering Societies Personnel Service, Inc., New York City, in which he indicates his appreciation for the service rendered by the Western Society of Engineers through their official publication—MIDWEST ENGINEER. He states:

> "Please express to the Western Society of Engineers my compliments on a very splendid magazine and my hope that it has continued success."

I should like to express my appreciation for your many kindnesses.

JOSEPH R. DECKER, *Manager*

Ralph F. Gross
1119 North Harding Ave.
Chicago, Illinois

November 13, 1948

I wish to take this opportunity of thanking the Society and yourself in behalf of the Chicago Architectural Club, for the fine cooperation extended us in the article published in the recent MIDWEST ENGINEER. The membership and I are very grateful to you for it.

Many thanks for your past courtesies and consideration.

Sincerely,
RALPH F. GROSS

Television's Future

D. F. Schmit,
Vice President in Charge of Engineering
RCA Victor Division, Camden, N. J.

Television, not too long ago merely an idea in the minds of scientists and engineers, has already fired the imagination of the public, won a substantial audience and enthusiastic advertising support, and become a vital and fast-growing industry.

About 350 advertisers are already using the medium. Receiver production for the year 1949 alone is estimated at 1,600,000 units. The number of receiver manufacturers has grown from five in 1946 to more than 75. And it has been predicted by observers who are not given to extravagance that television will become a six billion-dollar industry.

Yet, even though standards for television have been well evolved and this product of the laboratory has become one of mass production, television is far from a static thing. Its true greatness lies in the future. And again, to attain that future stature, which may well dwarf even television's brilliant accomplishments to date, engineers will be the fountainheads of television's development and growth.

At this writing, a third of the nation lives within the television service range. Forty stations are on the air. New television stations are going on the air at the rate of about five a month. More than 90 additional construction permits for new television stations have been granted by the Federal Communications Commission. More than 300 additional applications are pending in the files of the FCC. Efforts are being made to increase the number of stations possible by finding new portions of the spectrum into which television can be extended.

Television broadcasting is only beginning to expand towards its potential size. Engineers from stations and in the laboratories and factories operated by the television industry will play a critical part in television's future, and they'll be joined by others from surprisingly diverse fields.

From the broadcasting stations' technical staffs will come field strength and propagation reports, suggestions on how equipment can be improved, indications of future technical needs of the television industry and advances developed for the stations which are useful to others in television. There'll be suggestions and counsel on satellite station operations, on planned signal reflections, relay facilities, new developments ranging from camera dollies to highly directional antennas.

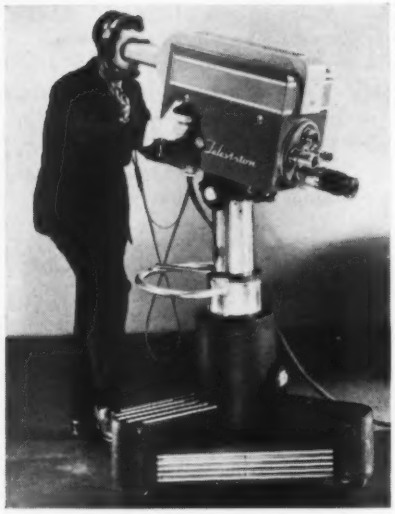
From the laboratories of basic raw material producers come suggestions on the uses of their products, incorporation of longer-lasting, more precise, less costly materials and components into television equipment, and new developments in all aspects of television which will improve performance and quality.

From all branches of industry will come suggestions, tests and support for a little-explored new art, industrial television. We will find the television "eye" observing where human eyes cannot safely be, peering into vats or studying processes where heat, poisonous gases, possibilities of explosion or other changes make observation precarious or impossible. We will find the factory engineers suggesting how television can be used in time and motion studies and where it can serve as a form of visual communication. Doubtlessly, many of television's wartime uses—when bombardiers could guide missiles to targets by use of television cameras and transmitters mounted in bomb noses beaming pictures of approaching targets to receivers in planes—suggest peacetime applications. For the discovery, testing and execution of such programs, tele-

(*Continued on Page 4*)

RCA's newly developed mobile television unit, which is virtually a "television studio on wheels," will greatly facilitate news coverage and other remote pickup operations.

View of medical operation televised on closed-circuit to medical students and doctors during recent American Medical Association convention in Chicago.



The new television studio camera developed by RCA Engineering Products Department employs a new studio-type image orthicon pickup tube which produces pictures with excellent half-tone shading.

vision's engineers will require the cooperation and active assistance of their fellows in the engineering fraternity throughout all industry.

Here is a field with wide scope, with effects on other fields and inherent potentialities that have barely begun to be explored.

Looking at another direction television may take in the future, some day television may well interlock with theatre entertainment. Though much remains to be worked out before theatre television can become an accomplished reality on a large scale, systems have already been developed and demonstrated for showing television on theatre-sized screens. Dramatically successful demonstrations have been conducted showing 15x20-foot images instantaneously with reflective optical systems and all details have been worked out for producing 18x24-foot images. Another direction of theatre television which is being explored calls for the images to be photographed off the face of the television screen, processed at extremely rapid speeds of well under a minute, and shown immediately after processing, or edited and stored for later showing.

Rights to program material, cost of equipment, means of sending programs to the various theatres, establishment of standards and other details have yet to be worked out, but the basic technical foundation for theatre television has been laid and the field seems rich in potentialities.

There is considerable confusion enshrouding higher frequency television operations. It has been proposed that higher frequencies be used for special television services, for more channels for standard home television reception, for higher definition television and for polychrome broadcasts. Only the more intrepid could make positive predictions about how television services can best utilize this comparatively unexplored portion of the spectrum. Yet we have here rich potential communications resources worthy of the attention of thoughtful engineers throughout the profession. Certainly more channels are needed for home broadcast service in addition to the present well-established ones. Extensive developmental work in color television is, bit by bit, thrusting aside the technical obstacles to its attainment so that, eventually, we will know how to produce all-electronic color television. In a few years, economic feasibility will be the primary obstacle to that new service.

The smaller communities, which find it difficult or impossible to obtain television service at this time, present a problem which the future may well see solved through the establishment of low-priced relay or rebroadcasting facilities, satellite station operations or low-powered, low-cost originating stations and economical program material sources.

This, too, is part of the invitation television extends to the engineer to spark his creative efforts.

In television we have a service that can perform sociological miracles. It can educate more effectively, completely and efficiently than any other communications method yet developed. But some means has yet to be discovered for the wide, general use of television in and by schools.

It can reveal findings, permitting hundreds to see where but a handful could see in the past. At a series of demonstations RCA Victor conducted for medical and surgical leaders, television cameras mounted above the operating field enabled thousands simultaneously to view intricate surgical operations. And it did this far more successfully than amphitheater observation could have. Television cameras have peered into the eyepieces of microscopes showing the subminiature world to audiences. They have observed at Bikini where death would have awaited human watchers. They have gone into subterranean worlds, televised the moon, explored the broad field of visual knowledge and brought their information to many. That work of high purpose can be expanded and extended in the future.

Meanwhile national television is daily becoming nearer to accomplishment. Regional networks are now in operation in the Midwest and in the East. These networks will be joined together this month. Other regional networks are gradually forming. By the end of 1952, television should be a national service, bringing to all parts of the nation program material from all other parts.

It's a strange, progressive, turbulent, many-directioned field, this television. With irresistible power it is pressing forward into a future of unparalleled repute and magnificence.

For the future, television is a factor of growing importance in the future of engineering, all industry, the nation and the world.

Bell System's TELE NETWORK OPENS JAN. 12

A new coaxial cable across Pennsylvania will enable Chicagoans to view the Presidential inauguration in Washington on January 20, according to present plans.

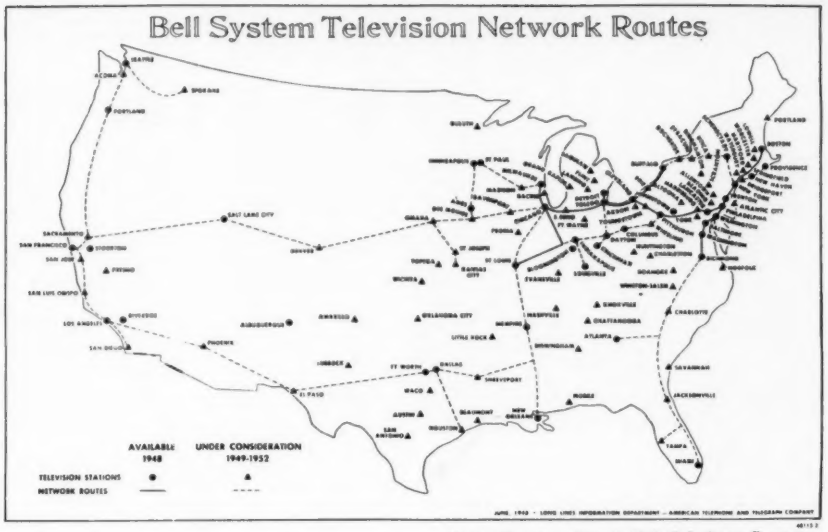
Primarily for long distance telephone service, the new 460-mile cable, between Philadelphia, Pittsburgh and Cleveland, will be available as a television link between the Bell System's East Coast and Midwest Networks beginning January 12, the day of its official opening.

The East Coast network links Boston, New York, Philadelphia, Baltimore, Washington and Richmond, while the Midwest net connects Buffalo, Cleveland, Toledo, Detroit, Chicago, Milwaukee and St. Louis.

Placement of the Philadelphia-Cleveland coaxial cable was begun in October 1947. About two-thirds of it was plowed directly into the ground and the remainder placed in conduit. Steel-armored submarine cable was used in crossing the larger streams and rivers encountered along the route.

Tackling one of their toughest jobs to date, Bell System construction crews had to cross seven mountain ranges between Harrisburg and Pittsburgh in Pennsylvania. With some of the nation's richest coal fields located in the Pittsburgh area, engineers had to find a route for the cable that would avoid strip mines and potential coal beds.

The coaxial cable is about as thick as a rolling pin and contains eight coaxial tubes, a pair of which, when fully equipped, is capable of handling about 600 simultaneous telephone conversations or two television programs. Each of the copper tubes is three-eighths of an inch in diameter. Running down the center of each tube is a copper wire about the size of a pencil lead, held in place by insulating discs. The cable is called "coaxial" because both the tube and the wire have the same axis.



Photo, Courtesy Illinois Bell Telephone Company

The cable also contains a number of ordinary wire conductors. Some of these wires are used for control of the cable's complex operating equipment, and others provide additional long distance service for cities along the route.

Since the strength of electrical currents carrying conversations through the coaxials diminishes rapidly, the signals must be renewed by amplification approximately every eight miles. This amplification is provided by equipment in small "repeater" buildings, which are constructed at regular intervals along the cable's pathway.

The Philadelphia-Cleveland cable project was a joint undertaking of the Bell Telephone Company of Pennsylvania, the Ohio Bell Telephone Company and the Long Lines Department of the A. T. & T. Company.

The 3,400 miles of intercity television network channels now in operation by the Bell System will be tripled in the next two years, spokesman for the Illinois Bell Telephone Company has announced. During this period, 21 cities will be added to the present 13 cities linked by the company's intercity networks on January 11.

Both Bell System coaxial telephone cable and radio relay facilities are employed for transmitting intercity television programs. Most of the additional video channels to be placed in service in the next two years will be furnished by radio relay. The longest relay system will run between Boston and Milwaukee, via New York and Chicago.

PRESENTING TOP TELEVISION FARE

STATION WGN-TV

WGN-TV, operating on channel nine, 186-192 megacycles, has an average radiated power of 30 kilowatts which should guarantee televiewers within a 45-mile radius of the antenna atop the Daily News building a sharper, better defined picture than they have received in the past providing their receivers are properly adjusted.

Pending completion of the Centennial Building adjoining Tribune Tower, WGN-TV occupies the entire 25th and 26th floors, and a part of the 24th, in the Daily News Building. The antenna mast reaches 427 feet above street level, the highest television antenna in the city.

The 26th floor houses the transmitter, projection room and film and music libraries. The transmitter is a laboratory type, which means it was constructed from WGN-TV engineering department blueprints and is the prototype for the production transmitter which will be installed in the Centennial Building when the station is moved. The projection room, used in the televising of motion pictures and slides, contains two 35 mm. projectors, one 16 mm. projector, one slide projector, and two film cameras. The film and music library is comprised of stand-by films as well as regularly scheduled feature and short subject films, specially produced films for television, transcriptions, and records.

Located on the 25th floor are offices, reception desk, studio, announcer's booth, studio control room, master control, dressing and property rooms, and workshop. The studio, 38′ x 43′, contains 3 television cameras and a microphone mounted on a boom. Two of the cameras are on one-man dollies, and another is on a two-man dolly, making all of them easily movable. These three cameras, and three others which will be used in baseball coverage, are field cameras, temporarily used in the studios. On order are three studio cameras for inside use only. All nine cameras are the image orthicon type, the latest in television development.

Looking into the studio is the studio control room, from which the producer directs the studio programs. Studio floor producers and cameramen are all equipped with headphones linked directly to the producer's "talkback" microphone, which permits him to give instructions without interfering with the production.

Sitting next to the producer are two engineers—one controlling the cameras and the other controlling the audio equipment. A bank of seven units, each with a screen, shows the images on the various cameras in use. At the present, two of these units are connected with film projectors, while three are connected with cameras. Thus, all channels are constantly monitored, and the producer specifies to the engineer the cameras which will be used for the "take." The end result to the televiewer is a variety of closeups, angle shots and changes in scenes, as the various cameras are in operation.

Also in this studio control room are the turntables for transcribed or recorded effects which may be called for.

The master control room houses all of the racks of equipment (circuits, amplifiers, etc.) for video and audio operation. The audio component of television, incidentally, is frequency modulated rather than amplitude modulated.

The announcer's booth is a small studio for use in narration or straight announcing without an image of the speaker. The booth will be used in conjunction with films and studio presentations in cases where just a voice is needed.

The program and Newsreel departments are on the 24th floor. The Newsreel facilities include a projection room, dark room and editing room. The eight-man staff will take news films around the clock for presentation nightly at 8 o'clock. Two fast station wagons on which movie cameras can be mounted will be used for film coverage, while a mobile studio especially designed by

Left: Bell Telephone Laboratories' entirely new, yet surprisingly simple vacuum tube amplifier which may be of far-reaching significance in long distance telephone and television transmission. Holding the tube is Dr. John R. Pierce of Bell Telephone Laboratories who developed it. Preliminary tests indicate the tube may amplify dozens of full color or black and white television programs simultaneously.

Right: Two-million cycle repeater for New York-Philadelphia Coaxial Cable. Trial installation near New Brunswick, New Jersey. Cover open.

Photos, courtesy of Illinois Bell Telephone Co.

Left, master control board at WGN-TV television station, and right, control room in individual studio at WGN-TV, showing monitors tuned to various cameras from which the director picks the scene to be sent out onto the receiving sets. Below, radio relay tower and monitoring station at Ogden, Illinois, which receives program from Champaign, relays it to Danville, where it is sent by cable to Chicago. Because of the curve of the earth the tower must loom above its surroundings.

WGN-TV engineers can be used for direct on-the-spot telecasting.

All equipment in the news department is for 16 mm. film—two projectors, 4 cameras in Chicago, and one camera on the West Coast. For interior shots, six portable television flood lights and four horizontal bar extension lights can be used. These lights are also available for regular studio productions. Lighting, incidentally, is still highly experimental in television.

Of special importance to the Newsreel operation, making news films available to televiewers in record time, is the Houston developer, a revolutionary invention which processes raw film into finished form for telecasting at rates up to 20 feet per minute.

Important in baseball and sports coverage is the Zoomar lens, another important development in television technique. This lens, costing $7,500, is installed as part of WGN-TV's equipment in order to provide the latest and best in telecasting. The Zoomar, so called because it "zooms" instantly into focus for long shots or closeups with a mere flick of the finger, greatly improves telecasting techniques.

WGN-TV, which represents more than a million dollar investment in equipment, staff and programs, provide the best television techniques and programs possible. The technical operation has been under the direction of Carl J. Meyers, director of Engineering for WGN, Inc., whose staff designed and built the station after years of research and planning.

The Babcock & Wilcox Company announced yesterday the release of a new 16 millimeter educational film, "Steam for Power," which depicts the development and application of modern steam boilers. The Company stated that this sound film, which is in color, will be of interest to civic groups, professional societies, engineering students and those interested in the production and use of power.

Making extensive use of both animation and photography, "Steam for Power" traces the important steps in the history of man's efforts to obtain ever more abundant and economical power by using steam to harness the energy released by the combustion of fuels.

Photo below, courtesy Illinois Bell Telephone Co.

A new 64-page booklet entitled "Explosives Products", devoted to the use of industrial and mining explosives, has just been issued by the explosives division of Olin Industries, Inc., East Alton, Illinois. It is available upon request to the East Alton office.

TELEVISION

To Remain Luxury Item, City Phenomenon; Will Complicate Home Routine

C. E. Hooper
C. E. Hooper, Inc., New York, N. Y.

Condensed from a talk presented before the Detroit Adcraft Club, Friday, November 19, 1948

Television has captured the imagination of America. Everybody is trying to get into the act. Actors, station owners, publishers, writers, advertisers, movie-makers, everybody. It looks so big and so appealing that it has also inspired one group to aspire to the audience measurement business. They would do it electronically. And I am not saying that one day the air will not be filled with audible or supersonic "beeps" each one of which energizes an electronic totalizer which counts and reports radio and television audiences in the split second needed to scan the broadcast spectrum.

A few weeks ago the Broadcast Audience Measurement Bureau, an industry-financed organization which estimates radio home totals in the U. S., published a figure of 37,623,000 as the "official" radio home figure for 1948 . . . up from 33,998,000 in 1946. The difference is 3,625,000. Now 3,625,000 radio homes with 3.8 persons per home represents 13,775,000 people. That is equal to the metropolitan areas of New York City plus Chicago plus Los Angeles. That *tremendous* increase in the size of the radio market warranted about one column inch in each of the radio and advertising trade papers. The space it might have occupied was filled with TV ballyhoo—much of it based on ratings we had released.

Now let's take a look at television. The total number of sets is estimated now at 650,000. Multiply these homes by 3.8 and you get 2,290,000. That is a market the size of the metropolitan area of Detroit.

Thus the most recent market story on radio shows an increase equivalent to New York plus Chicago plus Los Angeles. While this was happening radio (in the evening hours) has to a degree, but not entirely, lost the equivalent of Detroit to its precocious daughter, television.

Certainly television warrants attention, even demands it. But its economic significance, compared with radio, based on an estimate of 1,000,000 television sets installed by the end of 1948, is in the following ratio: radio—37 to TV—1.

It is going to take a sizable market to support television. Maybe one day it will be firmly entrenched in large cities. Even so, with sets at the price it seems necessary for them to command, it may be years before television becomes available at home to more than 30% of the U. S. population. 70% of the U. S. market will still be dependent on evening radio, and indications are that the daytime percentage will be much higher.

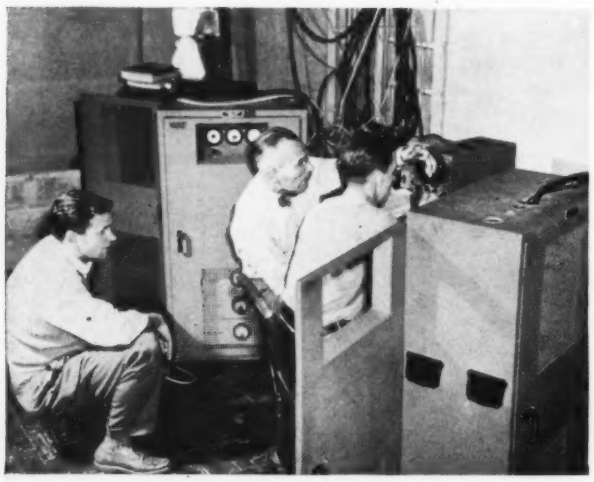
Daytime radio will have to compete with the well established radio programs, and with the vacuum cleaner. To get some realistic facts on the point of view of the American housewife toward her morning schedule, we made a survey last March, in New York where it looked like TV was coming first and fast. In addition to the 45% which "never listen daytime", etc., about 5% either "didn't know" or "didn't like" what was "on". 49% of the 4,000 home non-listeners told us in 57 different ways that they were otherwise occupied at the time—just "too busy" to listen.

And, if they are going to consume the volume of radio-advertised soaps, cleansers, wax ingredients and other concomitants of good housekeeping and if the American home isn't going to resemble the public dump, they had better be too busy to "look". Because to "look" one lays aside one's broom or paring knife, pulls down the blinds, puts out the lights, turns on the set, waits for from 28 to 32 tubes to heat up, makes adjustments on up to seven dials, sits down, lights a cigarette, and goes into a trance.

Hours later the head of the house returns home. By ten o'clock not a word has been spoken—though several neighbors have by now dropped in. The question is on everyone's lips: "How long does, how long can this go on?" If questions like that were not asked we would not have a measuring business.

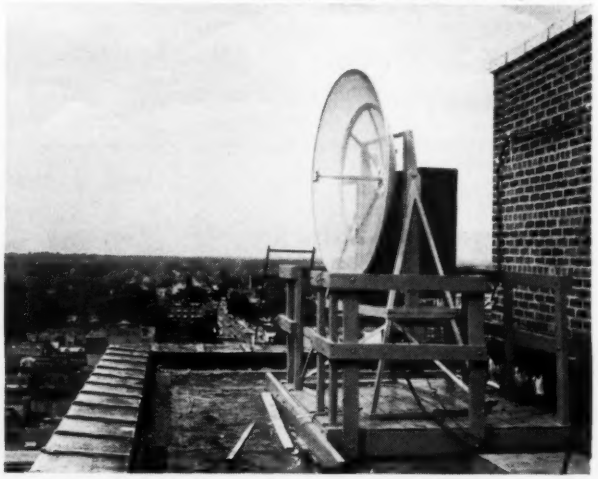
"When does the novelty wear off?" To provide the answer to that question

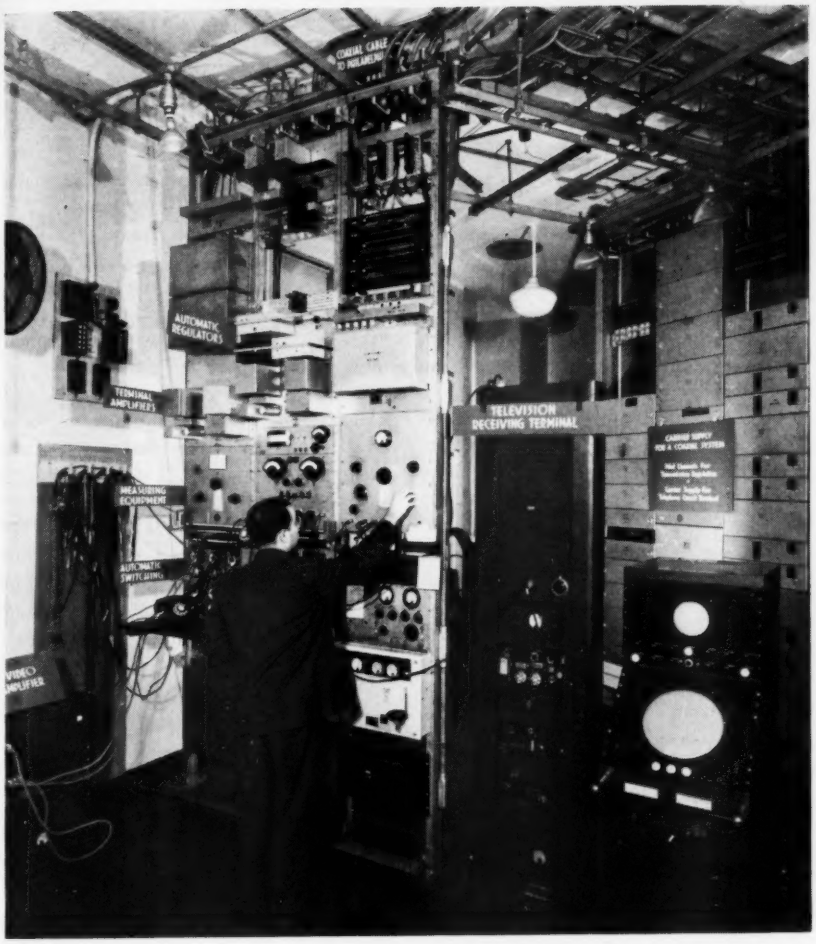
Control Room at Ogden, Illinois relay station. (See cut of radio relay tower, Page 7). Television image and FM sound originating at University of Illinois stadium, Champaign, Ill., are relayed from Ogden to Danville, Illinois.



Atop the First National Bank Building of Danville, the radio relay receiver catches television signals. Cables carry the program to the telephone building where it is switched into the coaxial cable and sent to Chicago.

Photos, courtesy Illinois Bell Telephone Co.





Photo, courtesy Illinois Bell Telephone Co.

Special television equipment used on the coaxial cable for network service at the Long Distance switching center in New York.

WNBQ Links To NBC Network

Station WNBQ in Chicago, which concludes its experimental operation period on January 8, will become a key production center for the NBC television network early in the new year. The NBC east coast and midwest links will be joined in regular service beginning January 12.

The Chicago station eventually will serve as midwest production headquarters for the NBC network which is planning a complete schedule of video fare for viewers from St. Louis to Boston. Additional cities will be added to the network as facilities become available.

Station WNBQ is planning a minimum of 18 hours of telecasting weekly beginning January 8 with network and local programs presenting studio and film shows and field pickups. Schedule details remain to be announced.

Reconversion of Studio "A" in the Merchandise Mart, largest studio in the NBC Chicago plant, into a modern television center is near completion. Film and news studios, scene-building and other workshops — all of the essential parts of a modern video plant — also are under construction.

The WNBQ transmitter, operating on Channel 53 with an effective radiating power of 21.8 kilowatts, is located in the Civic Opera Building. Jules Herbuveaux is manager of the NBC Central Division television department.

---

let's look at the results of some surveys we have made.

In the New York area we find a very high level of television set use. Evening levels are found to be for the most part between 45 and 70%, with the median around 60%. This is all the more remarkable when we consider that from 15 to 20% of the families are reported as not at home. Comparable figures for radio are 15 to 45% sets-in-use with the median at about 30%. In other words, television gets about 100% higher set usage during evening hours than does radio.

Our question now becomes "Is this high level of television set use a temporary product of newness and novelty of the medium?" In order to answer that one we did a special survey of three groups of set owners, those with brand-new sets, those who had had their sets from 4 to 12 months, and those who had had their sets for a year or more. This 60% level of sets in use was maintained by the first two groups, while the level of usage among those families having sets a year or more dropped only to 54%. Certainly there is a novelty factor initially in television, but interest wears down to a hard surface, and what now appears to be a high level surface.

But . . . *radio is here to stay.* Take that from the fellow whose specialty and chief interest for fifteen years has been the broadcast *audiences.* No advertiser in his right mind is thinking seriously of the idea of abandoning radio because of the advent of television. Radio is and will continue to be the greatest thing that ever happened to the majority of our population! Television is and will continue to be a big city and suburban phenomenon.

TOP CHICAGO PROGRAMS . . .

Kukla, Fran & Ollie

One of the delights of buying a television set is to discover Kukla and Ollie, those two whimsical moppets who, along with Chicago's most telegenic personality, Fran Allison, have set a high standard of entertainment in the new video industry.

Burr Tillstrom, who is responsible for Kukla, Ollie, and the rest of the puppets seen nightly at 6 p.m., over WBKB and the NBC Television Network, is not a newcomer to the business of television. Burr's first TV experience dates back to the summer of 1939 when he did "Jeep" shows for RCA at Marshall Field & Company in Chicago. He had turned down a trip to Europe when the following day he saw a TV demonstration. At that time he made the decision to make his fortune in television.

Later he took Kukla and Ollie to the New York World's Fair. He entertained at the Fair to the tune of 2,000 shows, some of which were telecast over the NBC station in New York. At the conclusion of the Fair, the puppet troupe returned to Chicago to do shows over the newly opened W9XBK. At this time the show developed to the point where guest stars made appearances with Kukla and Ollie.

Most television fans like the puppets for different reasons. Some like them for the characters themselves; for the piquant humour of Ollie who has a touch of the rogue in him. Others think Kukla makes the show. Kukla with his persevering, earnest soul, his sensitive but always forgiving heart. But all television fans are agreed that the creator and manipulator of this inimitable pair, Burr Tillstrom, is something of a genius. Anyone who can ad lib for an hour each day and manage always to be entertaining must be good!

Tillstrom is a youthful looking Chicago lad who came up in show business the hard way. He started puppetry as a hobby while attending Senn High School. He became seriously interested when he saw Tony Sarg's marionettes at the Chicago World's Fair in 1933. Helen Haiman Joseph, one of the best hand puppeteers in the country demonstarted to Burr the possibilities of working with hand puppets when she appeared during the annual puppeteers' festival in Detroit in 1936.

Tillstrom still isn't quite sure just when Kukla was born. It was at least twelve years ago when Burr was doing marionette shows. After these shows Burr would stick Kukla up over the top of the screen and let him make disparaging remarks about the talent of the other characters. The audience loved it. Then Burr began letting Kukla interrupt some of his more serious marionette productions. Kukla became so alive that he "began to speak for himself."

"I found I couldn't control him," says Tillstrom. "And the more irrepressible he became, the more people loved him. I began to realize then that Kukla was controlling my life. I had to give him full play or I felt uneasy at heart and my audiences were disappointed."

Not long after the birth of Kukla, Tillstrom created Ollie. Since then Kukla has worn out his wardrobe twelve times. Ollie and Madame Oglepuss, another veteran of the troupe, have had to renew their wardrobes eleven times.

Tillstrom is proud of his field and likes to point out that puppetry dates back to earliest recorded civilization. Puppet shows figure in the earliest Chinese and Javanese histories and were a part of court entertainment of the Romans and Greeks. Early Christians expressed their religious rites through puppets. In fact, the word "marionette" derives from "Little Mary."

Tillstrom uses no writers in the accepted sense of the word. But he considers Beulah Zachary, Lou Gomavitz, Fran Allison, and Jack Fascinato as his writers in that they furnish excellent ideas and serve as a sounding board for his own ideas. This foursome gathers with Burr every afternoon and they discuss the day's show until air time.

Burr feels particularly indebted to Fran Allison for the success of his show. "She is one of the most sincere, heartwarming persons in show business," he says. "Her great understanding and love for people of all ages are reflected in her work and inspire everyone connected with the show."

Besides his daily show, Tillstrom is supervisor of the Children's Theater of Marshall Field's, and spends much of his time giving encouragement to Chicago's young, hopeful puppeteers.

His greatest thrill? Tillstrom declares he has none, but Kukla knows better. One of the greatest puppeteers in the

(*Continued on Page* 26)

TOP CHICAGO PROGRAMS . . .

Uncle Mistletoe

Uncle Mistletoe, the little man who appears each year, during the Christmas season, at Marshall Field and Company, has become one of the favorite mythical characters of Chicago children, both young and not-so-young.

Developed by Field's as a symbol of the Christmas spirit of goodness and sentiment, Uncle Mistletoe has a very important mission. He not only implements Field's Christmas celebration in a merchandising sense, but gathers around his small self all the traditional lore of Christmas, the love and generosity, friendliness and hospitality. Thus, it is easy to see that he might very naturally become a year-round symbol of morality to Chicago's juvenile population.

The friendly "Uncle" not only appears in promotion pieces and window displays of Marshall Field's, but in colorful dolls with their red felt coats, black top hats, and small white wings, and even in small candle images.

Newest of Uncle Mistletoe's activities is his television show, Monday, Tuesday, Wednesday and Friday nights over WENR-TV. This enables him to see his youthful friends in their own homes, and bring them the stories of his animal acquaintances, written in the Uncle Remus tradition. More than twenty animal characters have been developed thus far. Each one of the stories is an original, written especially for the show, and each one follows the pattern of the usual child's story— situation, climax, and moral. Uncle Mistletoe usually has a part in the story, appearing just in time to save the situation and supply the lesson to be learned.

On each of Uncle Mistletoe's appearances on the television screen he is accompanied by Aunt Judy, his real-life aunt, the former Hollywood actress, Jennifer Holt. Each show is opened by Aunt Judy and Uncle Mistletoe, and when Uncle Mistletoe begins the day's story, "action" drawings illustrating the story come on the screen. From time to time Aunt Judy and Uncle Mistletoe come back to the screen to discuss the developments in the story, and point them out to the television audience.

The story strip represents a special development for television. The artist draws the characters on a heavy cellophane strip, which is drawn through a light-casting machine. This projects the images on a screen from which the television camera photographs it. Two screens and two cameras are used so that the shift from one frame to another is not apparent. Movement is achieved by pulling the film across the Tele-Cast machine. If an animal is running in front of a stationary background, a film overlay above the main story strip can be moved to achieve this effect.

Kling Studios, a Chicago firm of artists and photographers, developed the show expressly for Uncle Mistletoe and Marshall Field and Company, through their advertising agency, Foote, Cone and Belding.

Kling handles it as a "package" show, writing the script, drawing the story strip, and handling production details.

However, the cooperation with the agency and the store is close. Every two or three days a "story conference" is called, during which the agency representative, the studio artists, and writers, and the producer and director discuss coming programs.

Because Kling Studios specializes in photography for advertising, both still and movie, MIDWEST ENGINEER asked their producer on the Uncle Mistletoe show, J. M. Callan, what he considered to be the future of films for television shows. Mr. Callan gave two reasons for his confidence in films:

1. With film, an advertiser can cover many markets at the cost of one film production, plus the number of prints he needs. With a live show, his production costs would limit him to a very few markets, or to the cities covered by a television network.

2. The advertiser has complete control of what he gets. He doesn't have to sit in New York or Chicago, and worry about a West Coast show he is sponsoring. With film he can get special effects and special backgrounds. He can show his product in use in the home, and he doesn't have to move his production facilities from one area to another to cover the markets where his product is sold.

What kind of people does television require? A background in art, movies, radio is helpful, says Mr. Callan, and in addition, it helps if a producer knows where to find experienced performers and production people.

Television, even for a simple children's show, requires a large staff. On the night that MIDWEST ENGINEER covered the show, twenty-five people were required in the studio, including Aunt Judy and Skeets Minton, the puppeteer for Uncle Mistletoe; the Art Director Sam Singer, and his assistant, Bill Newton, handling the story strip; John Coons, who does the voices of Uncle Mistletoe and of the animals; the writer, Ray Chan; the Director, Greg Garrison, and the Producer, J. M. Callan; plus three cameramen, a sound effects man, and a script girl. This does not include, of course, the control room technicians, handling the electronic devices for sending the show out onto the television screens.

If you turn on your television set some Monday, Tuesday, Wednesday or Friday at 6:45 p.m., you'll see why Uncle Mistletoe has fast become one of Chicago's favorite television shows, especially for the small fry.

PRODUCTION

Of TV Shows Poses New Stage Problems Says ABC's Fassnacht

Television and theatre? Basically, alike, they have radical differences, says Monte Fassnacht, who should know. Currently Production Manager for Station WENR-TV, he has been as intimately tied to show business for the past decade as opening nights and curtain calls.

A native Chicagoan, he first became associated with the stage in high school. Hanging around the stage entrance of the Olympic Theatre (now the Apollo), on Randolph Street, Monte says he "became such a nuisance that the manager, in a fit of despair, hired him as assistant property manager."

In the years that followed he rubbed stage directions with such notable personalities as Ernest Truex, the Barrymores (Ethel, John *and* Lionel), the Dolly Sisters, and countless others.

Employment as a stage hand at the Garrick Theatre (now a motion picture house) and the Colonial Theatre (now the Oriental) backed his education at Northwestern University and from that institution he received a degree in engineering although he didn't pursue the profession.

On graduation he was employed at Chicago's famed Auditorium on Michigan Boulevard where he worked in turn as carpenter, electrician, and property man for the Chicago Civic Opera Company and became technical director of the company in 1938.

He has performed hundreds of major lighting jobs—Rodzinski's fabulous production of "Tristan" in Chicago in 1947; the "Wheels A-Rolling" pageant at the recent Railroad Fair and countless theatrical productions. He was also lighting director for several of Burton Holmes' motion picture productions.

As production manager for Station WENR-TV, Monte has multiple duties. He is in charge of lighting, property, sets, scenery, make-up, costumes, etc., for all television productions for the station and all Chicago-originated programs for the entire midwest TV network of ABC.

Costuming and scenery production for the theatre and for television are practically identical, according to Fassnacht. The greatest difference between the two lies in lighting and color. In TV, illumination must be from three to five times as great as in the theatre. Because a television tube reproduces only two dimensions, lighting can be employed to give an illusion of depth which is not otherwise discernible.

WENR-TV Dramatic Presentation, "Stand By For Crime," showing lights, camera, microphone in foreground.

In the theatre most lights are stationary and in video the lights are in an almost constant state of change and adjustment. In a similar way, one set of TV tubes will require two hundred and fifty foot candlepower for a "picture" which is acceptable to the engineers for telecasting. Other tubes at times require five to six hundred candlepower. In television, "model lighting" is more difficult since it takes a high candlepower to penetrate the overall lighting.

In television, the production of six programs in a period of four hours or less is not uncommon and, for each program, sets and lighting must be altered or changed entirely. On the contrary, although sets are changed in the course of one theatrical production, each play is repeated for days, or weeks, or, the producer hopes, for months and years. The video producer frequently has but two or three days in which to produce many programs in rapid-fire sequence.

One theatre burden not found in TV follows the adage of "what you don't

know won't hurt you." On the legitimate stage each light must be concealed from the in-the-flesh audience. In television only that which meets the camera eye must be disguised or removed.

Film backgrounds can be used in lieu of elaborate sets, or where scenic backgrounds are necessary. Recordings of music or special sound effects can be chosen from the station's library and reproduced on the turntable in the control room.

Color, though color television is little used, is a factor to be considered in staging TV productions, although differently than in the theatre. The producer of a theatrical production can determine in a glance what the audience will see. In television, colors are reproduced in black and white and occasionally it must be determined which colors reproduce black and which reproduce white on the tube.

Coordination Vital

Certain technical limitations such as the small stages, and the necessity of close timing are present in television, but good direction prevents their being detected by the TV audience. The television actors are at ease before the cameras, because all factors are well coordinated before the show goes on the air.

This is partly the result of the broad training of the actors. Most of them are radio actors with stage backgrounds. The production staff embraces not only radio and stage experience, but movie experience as well.

Make-up for television must be deeper than usual, or the face fades out—if too light, the face may "glow" so that no features will be defined. However, the make-up must also be more subtle than stage make-up—no heavy lines or dark grease paint.

Costumes are rented if they are unusual, but ordinary street and evening dress is furnished by the actor.

The WENR-TV Production Manager has at his command a construction shop for building sets and props, and a small staff of carpenters to do the job. On the staff is an artist skilled in set design, and another who draws the titles and other art pieces to be sent out on the screen.

Change Opera Building to Allow

WENR-TV INSTALLATION

All equipment used in the construction of WENR-TV was purchased from the Radio Corporation of America. Demolition and physical work on the station was started shortly after January 1, 1948 and nearly 100 persons, including supervisors, engineers, foremen and laborers worked daily, under the supervision of ABC and the Austin Company, general contractors for the network in Chicago, to meet the mid-September opening date.

The station is located on the 44th and part of the 45th floors of the well-known Civic Opera Building, 20 North Wacker Drive. The transmitter, 5,000 watts in power, is comprised of eight cabinets containing the latest video equipment as designed by RCA. An elaborate ventilation system has been installed to remove the intense heat generated by the operation of this equipment. The transmitter weighs 8,000 pounds and an additional 1,300 pounds has been added by the installation of water cooling equipment.

The antenna pole used for WENR-TV operations arrived in five sections. It was assembled and welded together on the 45th floor of the Opera Building and the cables and bat wings were attached at that time. Weighing 2,300 pounds, it was finally set in place, atop the building.

A great amount of reconstruction work and power readjustment was necessary to the Civic Opera Building as a result of the installation of ABC's video station.

A huge base had to be built to support the antenna and a gigantic hole cut through the building roof to facilitate the work of the engineers. The total weight of the base supporting the antenna is 7½ tons. A steel beam, weighing 4,000 pounds, was welded into the building framework to support this entire structure. New and larger transformers had to be installed in the Civic Opera Building basement by the Commonwealth Edison Company in order to supply the great amount of power necessary for the television operation.

Assisting Horstman in this technical operation were Robert Whitnah, station engineer for WENR-TV and WENR-FM; William Cummings, operational supervisor for WENR, WENR-FM and WENR-TV; and Hugh Abfalter, assistant to Whitnah.

WENR-TV has a mobile television unit, equipped with the most modern devices provided by the science of electronics, containing one camera chain with three cameras.

An outstanding feature of the unit is its extreme mobility. It is light in weight with extra-heavy-duty springs to withstand the weight of tons of equipment which are employed in local television operations.

Three cameras are supported on the roof of the unit with reels for all camera and power cables. It is equipped with a complete communications system including mobile telephone.

The unit is self contained with the exception of a power supply which is on an attachable trailer. Auxiliary lighting equipment is carried for on-the-spot news.

The station operates on Channel 7, 174-180 mc with a visual power of 30 kw. and aural of 15 kw. The antenna, 613 feet in height, is the highest in Chicago.

FLUID DEVOLATILIZATION OF COAL

A. D. Singh
President, Singh Company

Presented before the Gas and Fuels Section of the Western Society of Engineers, November 29, 1948

Fluidization as a chemical engineering unit operation has been successfully applied on a large scale in industry during the last several years, particularly in the catalytic oil-cracking operations. Fluid type catalytic cracking units of enormous dimensions, ranging in diameter up to 40 feet, played an important role in the production of high octane aviation gasoline during World War II. These units produced approximately 30% of our aviation gasoline requirements. The flexibility in control of operations, uniform treatment of solids through vessels, pipelines, metering devices and obeying the laws governing flow of fluids, have provided the engineer with a tool of extraordinary significance.

Fluidization Behavior

Fluidization is characterized by a phenomenon resembling the violent boiling or churning of a liquid. Actual gas velocity through the bed and the ever-changing flow pattern are rather difficult to determine. Particles for which terminal velocity has been exceeded are, to a large extent, retained in the fluid bed and particles for which terminal velocity has not been attained are lifted into the fluid bed. Such behavior can be regarded as being caused by a free exchange of kinetic energy between particles of various dimensions. During fluidization, those particles for which the terminal velocity is exceeded by the upward flow of the fluidizing medium are gradually carried away from the bed in motion. If the bed is not continuously replenished with these fractions, fluidization will either stop completely or develop undesirable features such as bumping, slugging and channeling. When a recycling system is provided with efficient dust-arresting means to prevent material loss from the fluid bed, equilibrium operational velocity for the prevailing particle size range can be established and satisfactory fluidization achieved.

Fundamentally, the behavior of fluidized coal in a fluid process should be similar to that of most other solids so long as there is no change in the physical state of the coal substance. This is shown to be the case by large scale operations involving fluid gasification of brown coal in Germany. Bituminous coal, however, due to its plastic property undergoes a physical change during a temperature range where appreciable devolatilization of the coal takes place. Such a behavior of a bituminous coal makes direct application of the fluidization process impractical.

Despite the obvious impracticability of applying the fluidization process to agglomerating or sticking bituminous coals, work was undertaken in 1943 to carry on a study of the fundamentals involving the control of particle size growth when a bituminous coal was charged into a fluid bed operating at elevated temperatures. A patient study of the chemical and physical factors involved yielded encouraging results during 1943. For the first time it was shown that highly agglomerating bituminous coals could be successfully handled in a fluid process. Early work was done on eastern Kentucky coals and the volatile matter content of the resulting carboniferous material, usually referred to as char, could be controlled within plus or minus 0.5%.

The potentialities of this process in the production of char from high volatile coals were first recognized in the field of metallurgical coke production. During World War II, due to transportation difficulties, the availability of certain types of coal in some important steel making areas, had become extremely inadequate. To overcome this difficulty, the application of the fluid process to the production of suitable coke-making coals was given an immediate trial. It was found that by blending the char with almost 80% of the high volatile coal from which the char had been prepared, metallurgical coke suitable for blast furnace operation could be produced. This deduction was based on a comparative study of the physical properties of the coke made experimentally with those of a coke produced commercially in the by-product coke ovens.

Power Plant Uses

The versatility of the process suggested its possible application in fields other than the production of metallurgical coke. For instance, it was recognized that if the high volatile bituminous coal used on a large scale in our power plants could be devolatilized prior to its combustion in boiler furnaces, a number of technical and economic gains could be expected. In order to establish the possibility of such an application, work was carried out in a 6" retort on Kincaid coal which is extensively mined in central Illinois and used to the extent of almost 25,000 tons per day in the utility plants of the Chicago area. The results of this study were presented before the Semi-Annual Meeting of the American Society of Mechanical Engineers in 1947. The important conclusions arrived at were:

1. Kincaid coal can be successfully processed into char by the fluid devolatilization process. The volatile matter of this solid residue could be controlled within a narrow range and its heating value improved to 12,180 Btu per lb., compared to the heating value in raw coal having 11,460 Btu per lb. The heating value data is on a dry basis.

2. Fuel gas suitable for utility distribution could be produced at the rate of 12,700 cu. ft. per ton of coal as shipped. This gas yield is higher than that obtained commercially from using premium quality coking coals in high investment by-product coke ovens.

3. The yield of tar could be made as high as 42 gallons per ton of coal, or completely gasified into fuel gas.

4. Desulfurization of the raw coal could be achieved to such an extent that almost 76% of the sulfur content in the original coal could be removed. The benefits to be derived from such a high degree of desulfurization will be reflected in longer life of certain heat exchange equipment in the plant itself, as well as in the curtailed emission of sulfur compounds into the atmosphere of an urban community.

5. Another distinct advantage in burning char instead of raw coal will be in a 4 to 6 per cent increase in the thermal efficiency due to a reduced hydrogen

loss in the chimney gases, as well as due to realization of sensible heat in the char produced. A utility system operating power generation and fuel gas distribution could exploit such a process to an important economic advantage.

6. A utility system operating on coal, of which we have an abundant supply to last over a period of at least 2,000 years, could render a stabilized and highly economical service in the distribution of power and gas to the communities it serves.

Other Applications

As pointed out previously, the process is highly flexible and offers tremendous possibilities in the improved utilization of coal in general. A few of the important applications in addition to those previously described are discussed below:

It is generally recognized through statistics that the railroads of this country constitute the largest single user of coal. This situation, however, is rapidly changing due to the advent of the Diesel engine. For instance, it is known that 90% of the new locomotives on order are of the Diesel type and some of the important locomotive manufacturers have completely stopped the production of steam engines burning coal. It is being freely predicted that in the next decade the railroad fuel market amounting to about 100,000,000 tons a year will be lost to the coal industry, due to the accelerated Dieselization program of all the railroads. No one can stop the progress in locomotive design. Gas turbine and Diesel type locomotives having thermal efficiencies three to four times higher than a coal burning steam locomotive, will displace this low efficiency engine. In view of these developments, the coal industry must consider ways and means of making coal available in such form that it will be a suitable fuel for gas turbine and Diesel type locomotives. The process discussed before this meeting appears to be a very important step in the direction of saving the railroad fuel market for the coal industry. As an example, the General Electric Company has a gas turbine-electric locomotive now undergoing road tests. Bunker C oil is used as a fuel for operating the gas turbine and it has been stated that this locomotive can carry enough of this fuel for a twelve hour operation. The tar produced in the fluid devolatilization of Illinois coal could be readily adapted as a substitute for Bunker C oil, and would, therefore, be a step in the direction of supplying coal as a fuel to such improved types of locomotion equipment.

Still another important application of the fluid devolatilization process can be considered in our national program dealing with the production of gasoline and lubricating oils for the internal combustion engines. For instance, the processing of coal in our important power plants alone could yield sufficient fuel gas, directly convertible into liquid fuels, to yield 40,000,000 barrels per year. These plants could also produce sufficient tar for the production of another 220,000,000 barrels of liquid fuels yearly. The possible production of about 260,000,000 barrels of liquid fuels per year in the important power plants of the nation is a highly important factor which we cannot afford to overlook.

The production of smokeless fuels for heating purposes is still another important factor to be considered for this process. With the public sentiment increasingly developing in favor of cleaner city air, it may not be too radical to predict that this market may go the same way in years to come as the railroad fuel market is going at present, unless coal is refined into improved types of fuels. At this point an argument might be made that crude oil and natural gas are not available in sufficiently large quantities to take on our national fuel load. This, however, constitutes self consolation by the coal industry, rather than a step of material aid in safeguarding its position on the fuels market. A partially crippled coal industry due to increasing competition from other fuels in the foreseeable future, would constitute a much more serious threat to our national economy than the possible exhaustion of our premium fuels through their extensive utilization. Through an aggressive development program to improve the quality and market value of clean fuels made from coal, the coal industry could not only strengthen its own position on the market, but could also render a great service to the nation by extending the life of the reserves of natural gas and crude petroleum by supplementing their supplies by the production of substitute fuels from coal. Further, it is estimated that the coal industry could almost double the market value of coal by refining it into gaseous, liquid, and smokeless solid fuels, as well as other important by-products, instead of offering it on the market as a straight fuel, as is being done at the present time.

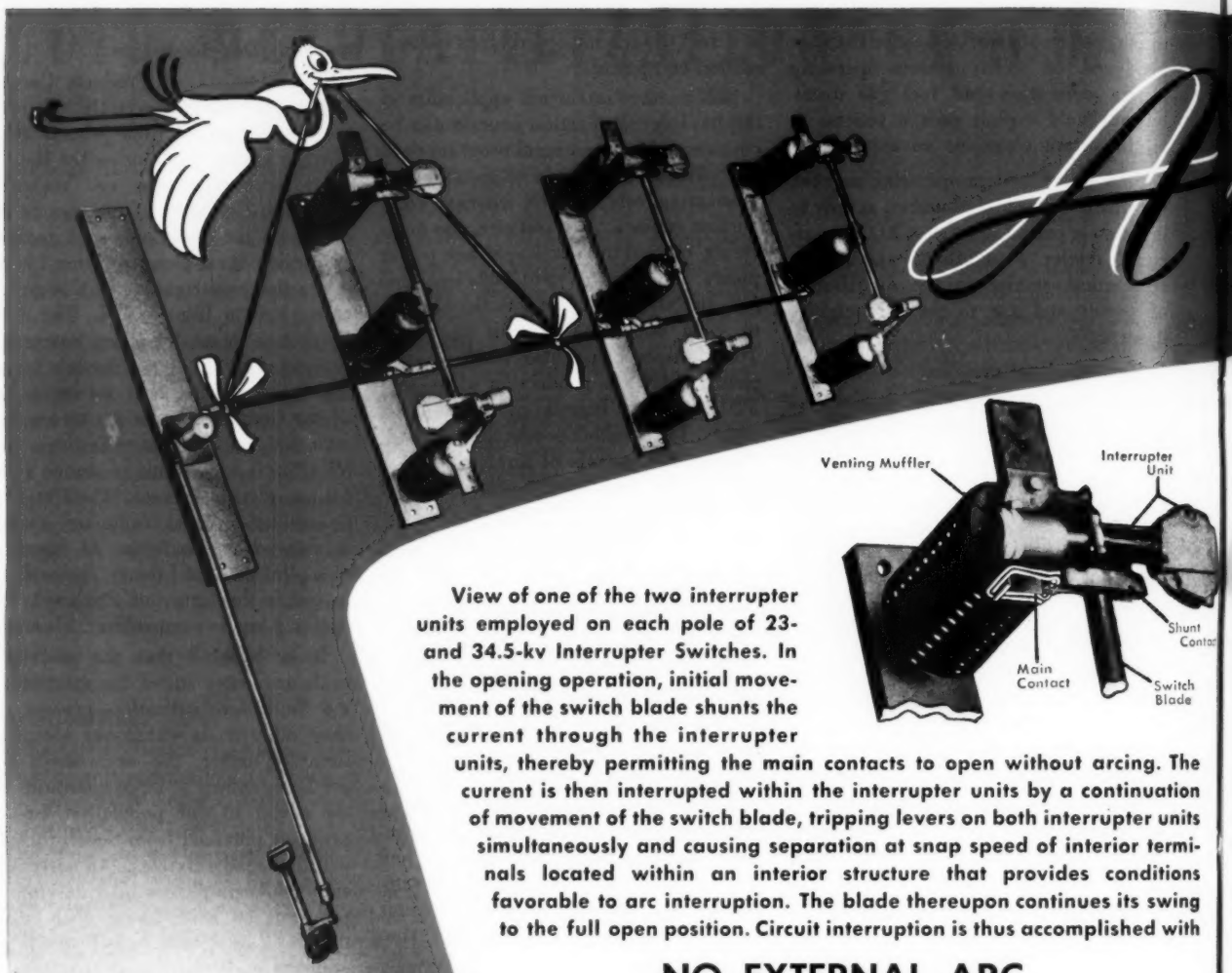
Current Developments

The Illinois Coal Products Commission which has importantly subsidized the development of this process as applied to Illinois coal during the last four years, several months ago authorized the Singh Company of Chicago to proceed with the development of engineering design for a Demonstration Plant to prove the practicability of this process as applied to Illinois coal. The design of such a plant has been successfully completed and its construction may be undertaken in the near future as soon as the Commission decides to go ahead with this development to insure a place for Illinois coal in our economic system for many years to come. The Pittsburgh Consolidation Coal Company recently announced the beginning of operations of a pilot plant at Liberty, Pennsylvania to insure the future of Pennsylvania coal in a highly competitive fuels market.

It is believed that the midwestern coals are better suited for utilization in the fluid devolatilization process than most other coals within our continental limits. Further, the midwestern coals are being mined in large quantities near the center of our population, and the products obtained from their processing will find ready markets. An early and a successful completion of a development program on midwestern coals would, therefore, be a boon to industry in general, the midwestern coal operators and miners in particular.

John W. Leslie, president and general manager of the Signode Steel Strapping Company since 1918, has been elected to membership on the board of trustees of Illinois Institute of Technology.

Mr. Leslie established and for a number of years supervised subsidiary companies of Signode in England, France, Belgium, and Italy. He served in World War I as a lieutenant.



View of one of the two interrupter units employed on each pole of 23- and 34.5-kv Interrupter Switches. In the opening operation, initial movement of the switch blade shunts the current through the interrupter units, thereby permitting the main contacts to open without arcing. The current is then interrupted within the interrupter units by a continuation of movement of the switch blade, tripping levers on both interrupter units simultaneously and causing separation at snap speed of interior terminals located within an interior structure that provides conditions favorable to arc interruption. The blade thereupon continues its swing to the full open position. Circuit interruption is thus accomplished with

NO EXTERNAL ARC

the principal feature distinguishing S & C Alduti Interrupter Switches.

Closed and open views of one of the main contacts used on 23- and 34.5-kv Alduti Interrupter Switches. High pressure "line" contact engagement between silvered contact surfaces is established with a rocking, wiping, toggle action which insures a clean, corrosion-resistant connection, and which disengages with a rolling, thrusting-out action.

TYPICAL APPLICATIONS

where 7.5- and 15-kv Alduti Interrupter Switches are already rendering meritorious service

Switching of both load and magnetizing currents on the primary of transformer banks

Switching of charging currents of large capacitor banks up to 2000 kvar on 2400-volt circuits and 3000 kvar on 4160- to 13,800-volt circuits

Breaking charging currents on overhead and underground feeders

Sectionalizing loaded distribution circuits

Switching plant feeders

Interrupting exciter current on feeder regulators

Throw-over from preferred to emergency circuits

And, when combined with S & C Power Fuses, short circuit protection is also provided.

S & C ELECTRIC

Arrived!!!!

23- and 34.5-kv INTERRUPTER SWITCHES

Again stepping out in front in the new approach to interrupting load, magnetizing, and charging currents... making an epochal advancement into the higher voltage range... S&C announces 23,000- and 34,500-volt Alduti Interrupter Switches to supplement this line, previously manufactured only in 7,500- and 15,000-volt ratings.

The new higher voltage interrupter switches are not merely projections from the lower voltage units but are essentially new developments, embodying valuable new features. Extensive laboratory and field tests have clearly demonstrated their applicability in:

(a) Sectionalizing loaded subtransmission circuits up to 600 amperes—the continuous current and interrupting rating of the switches—as well as breaking charging currents on overhead and underground feeders where conventional horn gap switches are inadequate.

(b) Switching 3-phase transformer banks up to 15,000 kva at 23,000 volts and 20,000 kva at 34,500 volts, either magnetizing or load currents.

In addition to performing the above functions, Alduti Interrupter Switches offer installation advantages in that they permit: (1) closer phase spacings, (2) simplification of structure, and (3) housing in a metal enclosure, although enclosures by no means are necessary in outdoor locations.

A new supplement to Bulletin 202A gives catalog information on the new 23- and 34.5-kv Interrupter Switches, and your inquiries are invited.

COMPANY 4433 RAVENSWOOD AVENUE
CHICAGO 40, ILLINOIS, U.S.A.

Formerly SCHWEITZER & CONRAD, INC.

Machine Tools for Industry

R. K. Vinson, Executive Director
Machinery Dealers National Association

Men of industry are usually interested in lathes, mills, drills, planers, and other metalworking machine tools and production equipment because they are part of the basic industries. Many of our leading industrialists have come from the rank and file of the great American pool of skilled and semi-skilled workers who have the "know-how" to produce metal goods. Many others have never touched nor operated a machine but understand their economic and practical functions.

The demand for metalworking machine tools began to grow with the popular acceptance of the steam engine, about the year 1800. With the development of better machine tools, at frequent intervals up to 1900, it became possible to build more effective engines.

About 1835 boilers were made of iron, which increased the pressure from 10 to 20 pounds per square inch. In 1855 the pressure was again increased to 35 pounds. In 1865 a pressure of 60 pounds could be generated. Then steel was used and a pressure of 125 pounds could be obtained. New metalworking machine tools were being produced that could work the hard metals easier and quicker. The period of industrial development from 1900 to 1948 finds us with an estimated 1,800,000 machine tools. The units produced by this growing inventory of better machine tools has earned an enviable reputation for our country.

About 1900 "used machine tool dealers" began to establish places of business in the larger industrial cities. In those days their principal function, just as it is today, was to purchase used machinery, then find buyers for their merchandise.

Later many of the dealers established rebuilding shops. The results of their services were economically sound, and today there exists a substantial industry of machinery dealers located in most of the country's major cities.

Some of the basic reasons why this industry has developed into a full grown industry are interesting.

1. Through his years of experience in buying and selling practically every type of machine tool available, the used machinery dealer is familiar with a wide variety of uses for most machines.

2. He is economy minded and can often help the small manufacturer or would-be manufacturer to get started on limited capital.

3. The dealer is an efficient appraiser of machine tools for buyer or seller.

4. He can make trade-in allowances when the manufacturer is buying new equipment. This service often assists the manufacturer in financing his new purchases.

5. Quick delivery of urgently needed machinery is one of his service features.

6. Because of his knowledge of the current national market, he can quickly locate "hard-to-find" items.

7. He has large stocks of available machines from which the buyer can select.

8. Time has proven that because of his knowledge, observations and desire to satisfy his customers, the "used machine tool dealer" can offer suggestions that are extremely valuable to most manufacturers requiring machinery that will help them make a profit.

9. Many dealers have excellent rebuilding facilities available for all sizes and types of machine tools.

10. He is a specialist in the redistribution of surplus machine tools and industrial equipment.

The machinery dealer does not build machine tools. His function is to find new users for tools no longer needed by the owners. However, he takes great pride in offering to his customers the world's best made, used and rebuilt machine tools.

Eight years ago the industry organized the MACHINERY DEALERS NATIONAL ASSOCIATION with headquarters in Chicago to deal with emergency problems created by the war. Like other associations organized during this period, there were the usual problems of membership, developing committees, policies and programs. These problems were approached with sincerity, intelligence, patience, and tremendous energy.

By the time emergency problems were liquidated, the industry was convinced that its trade association would be required in its peacetime industry problems. The same energetic approach to the new problems carried over and soon attention was being given to problems of arbitration, standardization, inter-industry problems, public relations, and others.

Chapters are located in the larger cities where monthly meetings are held to discuss mutual problems. In the fall, conferences are devoted to management and merchandising. Recently a two-day conference was held in Philadelphia in conjunction with the Wharton School of Finance and Commerce, University of Philadelphia. Three types of subjects were studied (1) Management Theory, (2) Economic Trends (3) Technical Dealer Problems.

The machinery dealers are proud of their trade association. I am confident they will continue to prosper as long as they continue to use it for the ultimate benefit of their customers, because this means more and better metal products for all of us.

Sales Booklet

Selling the product-back-of-the-product is the objective of a new United States Steel sales program which will give retail salesmen the inside story of the steel used in producing many of the household articles they sell to the public.

To accomplish this, 15 pocket-size sales training booklets are being prepared for use in retail sales training classes in stores throughout the country. The first four of the series are now being released to interested merchandisers by Carnegie-Illinois Steel corporation, United States Steel subsidiary, on a periodic schedule, covering steel, stainless steel, and porcelain enamel.

Imagination

And Judgment Vital Factors For Engineer Says NU Professor

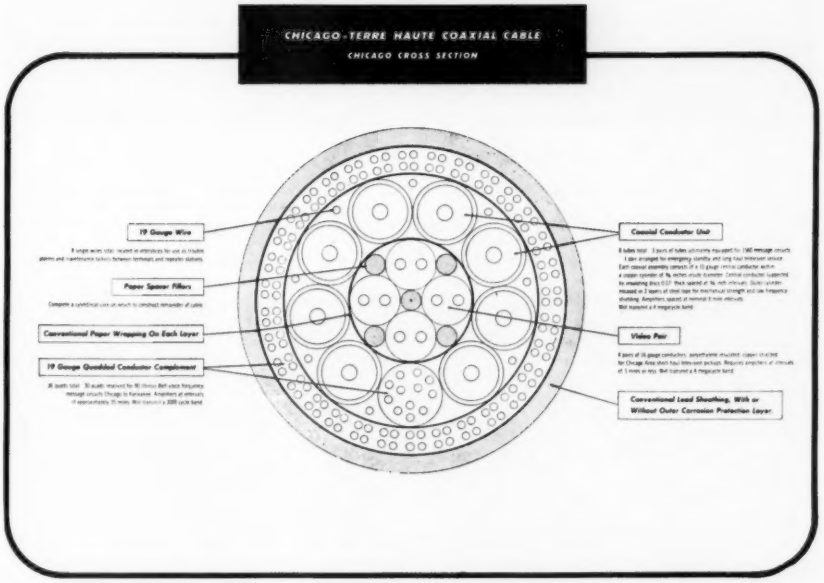
Imagination is as important in the field of engineering design as is the knowledge of science, a Northwestern Technological Institute professor said recently.

Dr. John F. Calvert, professor of electrical engineering and chairman of the department, attacked "the common feeling that intuition is emotional, not intellectual or scientific, and therefore not to be desired." Some inventors, he stated, have felt that they must become attuned to nature so that they may feel or envision the final work, as a painter, a musician or sculptor senses the form of his yet unfinished art.

There is, however, a vast difference between the "crackpot inventor" and the designer of successful new devices, the Northwestern University engineer pointed out. "Each must have developed that knack of arranging in the imagination the new and novel, but the difference is measured not by the degree of newness found in the ideas, but by the judgment with which they are weighed. The successful designer asks himself these questions: Why is this job worth doing? Is the magnitude of the improvement likely to make it unquestionably accepted, or is it apt to be only of a marginal sort? What will it require in men's time, money and materials? Is there something else which should take precedence? Yet the necessary appraisals must not dampen the ardor for achievement."

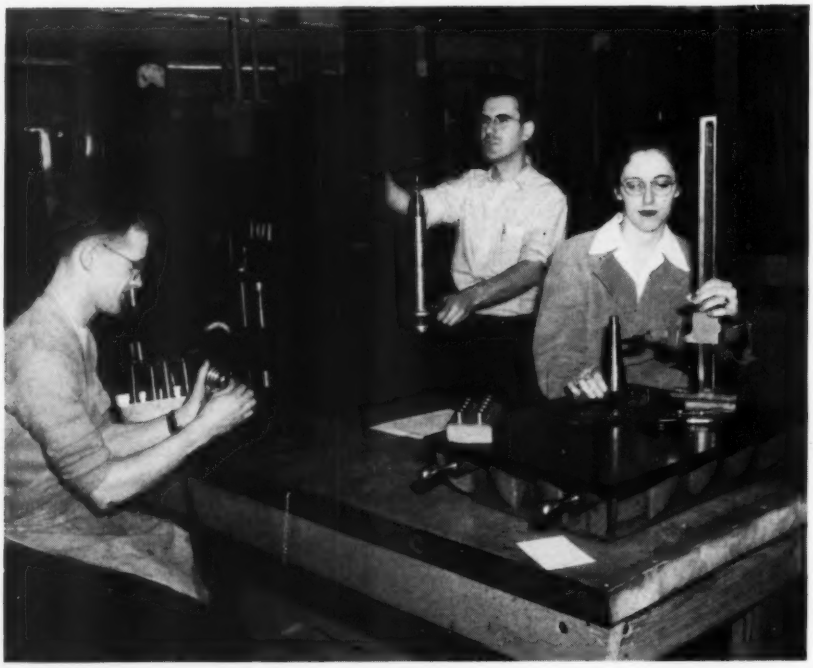
An engineering design should arise from some human need, the professor said. He suggested several areas of needs, which he considered basic and perennial: preservation of life and health; savings in economic values as defined by money, man hours and materials (which account for a vast number of engineering developments); greater opportunities for individual freedom of action through travel, communication, etc.; comforts in terms of the human senses; amusements and escapes from the daily requirements of life; release from drudgery; and release from worry, anxiety and fear.

View of equipment used in laying cable for television and long-distance telephone service. Photo, courtesy Illinois Bell Telephone Co.

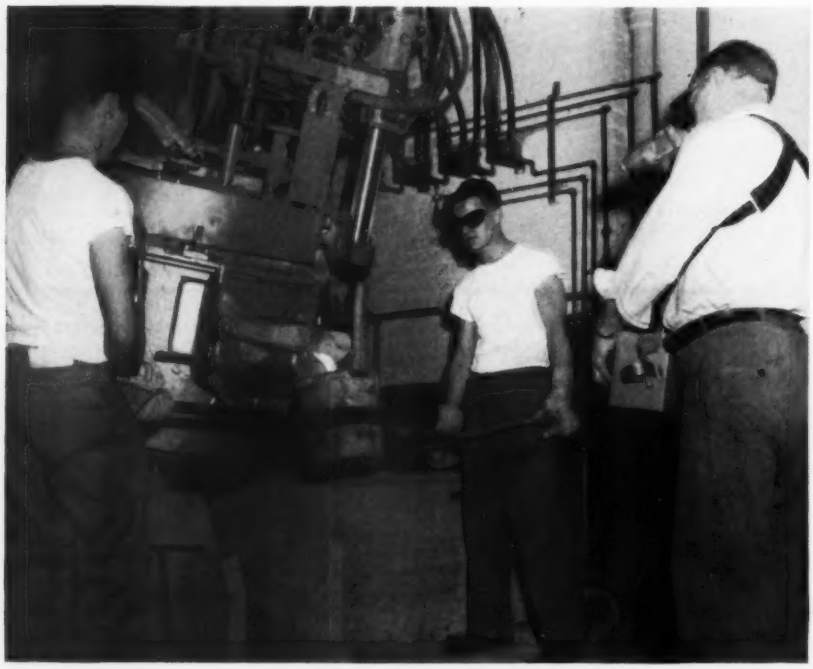


U. OF I. AT NAVY PIER

Offers Broad Foundry Courses



Above, students in Foundry Laboratory at University of Illinois at Navy Pier. Below, view of engineering students pouring molten metals in Foundry Laboratory.



An attempt to give civil and mechanical engineering students a broader concept of the construction industry than is to be derived from mere proficiency in foundry practices in patternmaking, mold preparation, and metal melting and pouring, is the aim of the newly-established machine and foundry laboratories of the University of Illinois' Undergraduate Division at Navy Pier.

In the fall of 1946, the University of Illinois, because of overcrowded conditions at its main campus in Urbana-Champaign, decided to establish the Navy Pier branch. Within two years, this branch has become fitted with one of the finest equipped engineering schools in the Midwest.

From what had been a naval training center where more than 50,000 sailors were instructed in mechanics during the recent war, the Navy Pier branch of the University of Illinois has now developed into a college with an enrollment in excess of 4,200.

The Navy Pier school is one of the first to take the actual production of molten metals out of the blueprint stage into the laboratory. This is done with the aid of melting equipment that includes a 3-phase electric arc furnace of 250-200 pounds capacity per hour for melting iron and steel, and a No. 30 crucible gas-fired stationary furnace for melting aluminum and bronze.

In the foundry and pattern courses the students are divided into two groups, one to take the foundry laboratory and the other to take pattern design. At the half-way mark in the semester, the groups are interchanged.

Professor Joseph S. Kozacka, head of the engineering laboratories, and former director of the war training program at Illinois Institute of Technology, believes that the engineering graduate entering industry today is expected to ultimately find his place in the supervisory, executive, or managerial capacity, and therefore needs a wide knowledge of the various methods of metal fabrication.

The aims and objectives of the pattern and foundry course is to give the student an understanding of:

(1) The necessity and advantage to the engineer designer of knowing the effect of design on the properties of the part produced by particular methods of fabrication.

(2) The need for and use of methods of engineering control in obtaining the best possible properties at the least cost in casting as one example of manufacturing.

(3) The processes, materials, and products of the foundry as an example of fabrication, producing engineering parts for use in industry.

(4) The types of casting and their properties produced by ferrous and nonferrous classes of metallic alloys and their engineering fields of application.

A concrete laboratory was recently set up and equipped with the most modern devices available. A $10,000 concrete testing device capable of exerting pressures up to 300,000 pounds has been recently acquired. This "L"-type universal testing machine is adaptable to any test utilizing the proper testing tools.

A feature of the machine shop is an inspection room comprising many examples of tool-grinding equipment, drill presses, large and small gear shapers, hydraulic-driven planers, and some special purpose machines so necessary in precision shop work.

Adjoining the inspection room is the superbly equipped tool room or "crib". Here hand tools, measuring devices, tools requiring rack storage, spare parts, maintenance equipment — anything that calls for custodial care — are made available to the users of the shop equipment, whether students, instructors, or in some cases representatives of other departments who require tools or specially worked parts for use in their instructional activities.

Lectures on theory are given the shop classes. Field trips are made to manufacturing establishments in the vicinity. Training aids, both strip films and movies, are shown. Attendance at exhibitions sponsored by the machine tool and similar industries, is encouraged. The interesting meetings of the local student branches of engineering societies are well attended.

Postmaster General Jesse M. Donaldson has announced that as an accommodation to users of air mail, a new 4-cent air mail postal card will be made available by the Post Office Department on January 10, 1949.

Elect Patterson New President Of Steel Group

N. R. Patterson, president of the Patterson Steel Co., Tulsa, Okla., was elected president of the American Institute of Steel Construction at its 26th annual convention held in Quebec, Canada, Oct. 4 to 7. The 1949 convention will be held at White Sulphur Springs, W. Va.

The attendance of 625 people set a new high for the Institute.

Retiring president T. R. Mullen, head of Lehigh Structural Steel Co., Allentown, Pa., announced that the fabricated structural steel industry is ready to operate any governmental plan of production in the event of war, with a minimum of delay. The industry would need little conversion of facilities, Mullen said. He pointed to its World War II record, when it turned from ordinary building to construction of naval landing craft on short notice.

Wilfred Sykes, president of Inland Steel Co., Chicago, Ill., charged that an attempt is being made "to put American business in a straight-jacket." He said the Federal Trade Commission and the Supreme Court "follow some theory, without actual experience in business or concern for the welfare of industry." Sykes criticized recent Supreme Court decision in the Cement Case, outlawing the "basing-point" system of distribution.

David Austin, vice president, United States Steel Corporation, said a postwar expansion of steel-making facilities is costing the industry $1,600,000,000 and that any more drastic program might result in idle plants, due to shortages of raw materials and manpower.

Jonathan Robinson, minister of mines of Quebec province, said the new Labrador iron ore development will cost 300 million dollars before ore is brought out but that the deposit will yield 300 million tons. He described another ore field, rich in titanium-bearing iron, located in Ungava, within Quebec province. This field, being developed by Kennecott Copper interests, probably will yield ore by 1951. A huge smelting plant soon will be in operation at Sorel in Quebec province.

Personal

Ludwig Skog, senior partner of Sargent & Lundy, Chicago firm of consulting engineers, has been elected to membership on the board of trustees of Illinois Institute of Technology, Dr. Henry T. Heald, president, has announced.

Born in Bodo, Norway, Mr. Skog obtained his M.E. degree from the Trondheim Polytechnic Institute in Norway.

In 1909 he became a draftsman for the Inland Steel Company at Indiana Harbor, Ind. He joined Sargent & Lundy as draftsman in 1910 and has been associated with the firm since.

From April 1943 to February 1946 he was loaned by his firm to Kellex Corporation as engineer in charge of design and construction for power development and mechanical process engineering for the Oak Ridge gaseous diffusion plant.

Mr. Skog is a member of the American Society of Mechanical Engineers, American Society of Testing Materials, Western Society of Engineers, American Welding Society, and the Union League Club.

The Engineer and

THE TRADE ASSOCIATION

The article, "The Engineer and the Trade Association," was prepared as an outgrowth of discussion among members of the Committee on Public Understanding of the Trade Association. The Committee is composed of representatives of the American Trade Association Executives, the National Industrial Council and the United States Chamber of Commerce. Its work is part of an over-all program to acquaint industry and business with the widespread valuable activities of trade associations in different fields.

Many engineers ask the question: "What is a trade association and what does it do?" They know, of course, that very close connections are maintained between the engineering profession and the trade associations of America. Many engineers are active in association affairs.

There is a close interdependence between the two professions. The engineer can and does offer the trade association abundant technical knowledge and service. The association, for its part, can provide the engineer with specialized information and service, often unobtainable from other sources. Occasionally, this interdependence results in a working relationship between the association and the engineer. Many engineers have valuable positions with trade associations, working on association-sponsored research.

Despite the awareness of these matters among engineers and others, there is still some haziness and a lack of understanding concerning trade associations, their history and their functions.

Every engineer serving with industry will find it to his advantage to cooperate with the trade association representing that particular industry. In many quarters the full value of trade association efforts in improving industry's performance is not fully known or appreciated. Similarly, the trade associations need the active and vigorous support of the engineering profession. They benefit materially from the kind of help that engineers can give by participating in industry-wide activities.

Nearly every American industry, large and small, has its trade association. There are well over 2,000 national trade associations, according to the latest figures compiled by the Trade Association Department of the U. S. Chamber of Commerce. There is at least an equal number of associations organized on a state or regional basis, according to the Chamber of Commerce survey. In addition, there are an estimated 4,000 purely local associations. These represent every type and size of business in America.

The general objective and justification of these trade associations, as shown in histories of the outstanding groups, is to foster and promote the particular line of business in which their respective members are engaged. To achieve this end, trade associations use a great many techniques, with perhaps as many variations as there are associations. Some groups do it in a broad way, as through programs designed to promote the public interest. Other associations concentrate directly on special interests, such as product development, employer-employee relationships, sales promotion, etc., of concern largely to themselves.

In any event, the keynote of association work is service, either direct to the public, or to members of a particular industry, and thus to the public. Generally speaking, the success and popularity of an association among its members is in proportion to the amount and quality of service it renders. Likewise, the amount and quality of service rendered to the public often makes a good deal of difference in the feeling of the public toward the industry the association represents.

It is hardly necessary to point out what the modern trade association does *not* do. It does not engage in price-fixing. It does not act as a trust. No responsible trade association takes part in such activities.

Another feature of trade association groups is their "not-for-profit" aspect. Most associations rely on membership dues, levied frequently on the basis of members' production for the previous year. Usually these dues are enough to pay for the association's normal activities, with perhaps a reasonable operating surplus.

Practically every association tries to supply its members with up-to-date information concerning its activities and new developments affecting its industry. Usually this is done through bulletins and other publications which go out from time to time. The material carried in such bulletins or publications may cover such matters as trade news, technical developments within or affecting the industry, government relationships or regulations, foreign trade prospects, product promotion and many additional matters of possible interest to an industry.

Meetings and conventions for members of trade association groups provide opportunity for them to discuss matters of interest to the industry, and give them opportunities to hear authorities speak on subjects pertinent to their field.

In these two areas—publications and meetings—engineers play an especially important part in trade association work. Engineers of all kinds, as well as other men of science, constantly supply the technical information for the use of association members. They often are featured and desirable speakers at association meetings and conventions.

Almost all associations concern themselves with governmental relationships. They keep members informed concerning government activities of interest to them—tax matters, government sponsored research, legislative news, tariff and trade agreement policies, specifications or standards announcements, etc. Many national trade associations have their headquarters in Washington or maintain Washington offices.

A trade association may also find it necessary and desirable to cooperate with government agencies. Just as the government has a great deal of valuable information available for trade association members, so does the industry trade association have a store of valuable information which government agencies can use. The fine results available through such cooperation were seen during World War II; and such cooperation undoubtedly will continue.

Trade associations naturally cooperate with other groups having allied interests. Not only do associations cooperate among themselves, but they do so with universities, research foundations, private corporations, etc. Here again, the role of the engineer is obviously a large one.

Product and sales promotion is another and relatively new activity for trade associations, but one which is

growing rapidly. More and more associations are developing programs for product promotion through cooperative effort. These programs have often shown more success and frequently carry less expense than individual promotions. Where this has been proven, trade association product promotion programs have received wide interest and support from member companies. While the nature of cooperative promotion work often makes it difficult to show proven results to member companies and to enlist whole-hearted support, financially and otherwise, the product and sales promotion program of many associations have proven so successful that they constitute their foremost activities.

Included in trade promotion work may be such different functions as cooperative advertising by the association itself; efforts to increase the extent and effectiveness of advertising done by members; promotional publicity by the association or by the members or both; the preparation of sales promotional booklets and other material; exhibits and exhibitions; development of new uses for industry products; technical and engineering services; cooperative shipping and merchandising; collection and distribution of inquiries for products or services for members; and other methods to improve the product, and to increase the demand for it.

Engineers Contribute

An increasingly important factor in the steady growth of the American trade association has been the work contributed by the engineering profession. The program of one group, the Diesel Engineers' Association, can serve as an illustrative example of what many other associations are doing. The Diesel Engineers', through a chief engineers' committee of its member companies, and through other research and discussion, has provided its industry with valuable data in the production of fuel for Diesel engines. This, of course, is just one of the many services performed by this group.

This association and others which maintain engineering staffs have also worked out programs to standardize mechanical parts used by their industries.

In addition, engineers in trade association work are well known for their cooperative programs with engineering schools and colleges, particularly in the field of mechanical engineering. Almost every major school of engineering maintains a cooperative program with an appropriate trade association.

Also high on the list of association activities are public relations, research, statistics, personnel problems, safety program work, training of industry employees, legislative work and industry or trade publications, as well as others. In addition, associations are always in a position to render many direct and specialized services to individual members.

This indicates just how much trade associations have developed into *service* organizations. They seek to bring about more efficient production and distribution of higher quality products, to develop more efficient personnel, to create better public understanding of the trade association and the trade association movement, and to increase the amount of business for member companies.

The successful trade association is one which recognizes that its primary reason for existence is to improve the efficiency of its industry and its members. Ultimately, the public feels the benefit of such increased and improved efficiency. Therefore, the trade association movement recognizes that any sound program of industry service should be built with a sense of responsibility toward the public, the ultimate consumer of all products.

This sense of public responsibility on the part of the trade association is perhaps best illustrated in the trade groups' great contributions to industrial research. Such research work is the area in which the engineering profession and the trade associations most closely cooperate.

When trade associations entered the field of research some fifteen or twenty years ago, their leaders recognized that the continuous and increasing application of scientific and economic research to industrial problems in the nineteenth and twentieth century had made significant contributions to the high standard of American living. Public, management, and labor accepted research as a constructive force in American business.

Through the use of university facilities and well-trained professional help, trade associations are cooperating with a profession which boasts the highest ethical standards.

Associations sponsoring research programs are motivated by one or more of the following objectives:

1—To find new and better articles of commerce.
2—To reduce costs.
3—To discover new and improved materials.
4—To find new uses for products.

Each of these purposes has constituted the justification for research work by a number of associations.

Research Planned

The association research program calls for careful and intensive preliminary planning. In fact, the preliminaries to such a program are a research activity in themselves! Competent estimates of costs, space requirements, number of people to be employed, work to be accomplished, all call for the skill of trained technical help. The more thorough the preliminaries, the more convincing the research program will appear to members.

Trade associations are proud to point out that many valuable research projects are possible only through group effort. This is particularly true for smaller companies. But even for large business firms, with their own well-equipped laboratories and technical staffs, group effort has been shown to be desirable.

Some examples of trade association research work are worth pointing out. One large group, The American Bakers Association, has conducted excellent research projects designed to improve sanitation methods in commercial bakeries. The Portland Cement Association, the American Meat Institute Foundation, the Farm Equipment Institute, the Cooper and Brass Research Association, and many others, have conducted research projects, with satisfactory results to members and the public alike. In some instances, associations have built their own research and engineering plants.

In all of these research efforts the engineering profession has had a large part. Engineers in every field have had their part in the work of testing, specifications, standards, discovery of raw materials, sanitary work, mechanical improvements and many other endeavors.

This cooperation is likely to continue. More and more associations are entering the research field and those already in it are constantly expanding their activities. The end will be to promote better business, a more satisfied public and the healthy growth of the American individual enterprise system.

In Campus Development, Research

I. I. T. Moves Ahead

Illinois Institute of Technology was created to meet the growing demands of a great midwestern industrial empire of which Chicago is the hub. Over the years, since the merger of Armour and Lewis, Illinois Tech has geared its educational and research program to meet these demands and to serve the public which supports it, President Henry T. Heald said at a press luncheon this month where MIDWEST ENGINEER was represented.

The two schools combined in 1940 "to do a more effective job of engineering education and research," and to carry on a program of original research which Dr. Heald considers requisite of all technology schools.

For the first year the budget for the combined schools was $1,700,000, compared with an operating budget for 1948 of $8,025,000. Illinois Tech, from the beginning, has been interested not so much in total expansion, as in doing an increasingly good job.

Since neither school had the proper plant for 2500 undergraduates, considered to be the "normal load" for the combined schools, campus development became one of the first considerations. The existing seven acres of the Armour campus would serve as the core of an eventual 100 acre campus to be carved out of the surrounding slum area. Seventy-five per cent of this area has now been purchased, but demolition of old buildings which occupy much of the area is impeded by inability of present residents to find other housing. Thus it ties in with the city-wide program of low-cost housing construction, and slum clearance. The New York Life Insurance housing project is immediately east of the campus, another sponsored by the city is to the north.

Illinois Tech hopes to have a building under construction at all times. Of the projected buildings of the campus plan, completed are Chemistry, Chemical and Mechanical Engineering, two dormitories for men, one of three ten-story apartment buildings to house students and faculty, and two Armour Research Foundation laboratory buildings.

The new Chemistry Building was partially occupied in September 1947, and all undergraduate laboratories were in operation in the new quarters by mid-year. The new Metallurgical and Chemical Engineering Building was opened for classroom and office use in February. Extensive landscaping around these structures and Alumni Memorial Hall has attracted much favorable attention.

Scheduled to be started in Spring, 1949 are buildings to house the Institute of Gas Technology, the Association of American Railroads, and the new Heating Plant.

New permanent construction and the temporary structures obtained through the Federal Works Agency have doubled educational space in the past two years, while the increase in the student body has been slight. Consequently, the extreme overcrowding has been relieved to a great extent. Some departments have superior facilities, and nearly all departments have benefited from some improvements. Existing deficiencies are now even more apparent because of the contrast between the old and the new.

Campus expansion has taxed to the limit the capacity of the old heating plant, outmoded long before the additional load of new structures. Contracts have been let for a new plant, and completion is scheduled for Fall, 1949.

The Technology Center "family" according to Dr. Heald, includes 10,000 people working or studying on the campus. In addition to its educational and research activities, Illinois Tech carries on research through three affiliated organizations:

Armour Research Foundation, conducts research problems for industry, government, trade associations. Employs some 600 people and occupies several buildings.

Institute of Gas Technology, supported by about 75 gas companies, trains students for gas industry, and conducts research for the industry. About 50 to 60 people are employed.

Association of American Railroads, to be established next year, will conduct research on basic railroad problems.

Armour Research

The recent rapid acceptance of research as an integral part of our industrial economy has resulted in the growth in size and number of non-profit public service organizations devoted to industrial research. Twelve years ago, the Armour Foundation pioneered in this field; today it is the largest organization of its kind connected with an educational institution, and its pattern has been widely adopted by other universities and by independent research institutions.

Armour Research Foundation of Illinois Institute of Technology, a separate corporation, is directed by the same Trustees and officers who serve the College. Administratively, it is a separate entity with a full-time staff. Members of the College faculty are available for consultation by the Foundation, but only occasionally, under special arrangement, do they undertake actual project work in the Foundation. Members of the Foundation staff occasionally teach their specialties in the College departments.

The soundness of this plan of operation has been demonstrated by the steady growth in volume and professional attainment of the Foundation.

Jesse E. Hobson, Director of the Foundation since 1945, resigned in

Applications for fellowships in gas technology at the Institute of Gas Technology at Illinois Institute of Technology will be accepted until March 15, 1949, Elmore S. Pettyjohn, director, has announced.

Fifteen fellowships paying $125 per month for ten months, with increases in the monthly stipend in following months, are available, he said. Formal appointments will follow the application deadline.

Two-year fellowships lead to master's degrees and additional two-year fellowships are available for work leading to the Ph.D. degree.

Seniors and graduates under 28 in chemistry, chemical engineering, mathematics, mechanical engineering, and related fields are eligible.

The Institute of Gas Technology is an industry-sponsored research and educational institution affiliated with Illinois Tech. Application blanks should be addressed to the Director, Institute of Gas Technology, Technology Center, Chicago 16.

March to become Executive Director of the Stanford Research Institute. Thomas C. Poulter, the Foundation's original director, who has devoted himself solely to scientific work in recent years, resigned in June. He is now Associate Director of the Stanford Research Institute. Haldon A. Leedy, Chairman of the Foundation's Physics Section and a member of the staff for 10 years, replaced Dr. Hobson.

Gas Technology

The Institute of Gas Technology has continued its program of research and graduate education, with a large portion of its research sponsored by the American Gas Association.

Plans for a new building to house this activity have been considered carefully during the past year, and substantial contributions toward construction have been made by American gas companies. Despite high building costs, the Institute's Trustees hope to break ground at an early date.

Railroads Laboratory

One of the year's most promising new developments was the announcement that the Association of American Railroads would establish a new laboratory and research headquarters for its container bureau and mechanical and engineering divisions on the Illinois Tech campus. To be built at a cost of approximately $625,000, the laboratory will contain offices for the research staff, a humidity room for controlling test conditions, and laboratories for mechanical and electrical engineering, refrigeration car and packaging and container studies. A 600-ft. impact test track will be placed alongside the laboratory building.

PERSONAL

J. C. Witt, for the past ten years technical director of Marquette Cement Manufacturing Company, is now consulting engineer. This ten-year period has marked the most rapid growth of Marquette, the number of plants having more than doubled.

Mr. Witt is an engineer of broad training and experience. His first studies were in science, leading to a Ph.D. degree, in chemistry and physics, at the University of Pittsburgh. Later he was graduated in mechanical engineering at Armour Institute of Technology, subsequently receiving his professional M. E. degree. He is a member of the Western Society of Engineers.

Crerar Library

Research Information Service

When the Directors of The John Crerar Library approved a contract with the Atomic Energy Commission in July of this year, they embarked on a program which makes the library an active participant in the nation's industrial research.

If the investments of several hundred millions of dollars per year in industrial research are to be wisely and profitably spent, the fullest possible use must be made of scientific reports already published. The object of Crerar's Research Information Service is to explore the raw material of scientific discovery to disclose technical information of value to its industrial clients.

Research Information Service offers a wide variety of technical reporting, ranging from preliminary surveys on the extent of information available in the library on a given subject, through critical analyses of the technical literature. These analyses may call for selected bibliographies, abstracts, or even extensive analytical reports. The character of service is varied to fit the special needs of the inquirer. Whether he comes from an organization with a research laboratory and a special library, or from one lacking these advantages, R. I. S. is prepared to supplement his present resources of technical information.

Important supplementary services have been provided through improving the lighting and furniture of the departmental reading rooms, and through the development of a special reading room on the 15th floor for research personnel engaged in making intensive use of the library's collections. The latter is intended especially for researchers whose library work can be facilitated by the typewriters and dictaphones available in the library for their use.

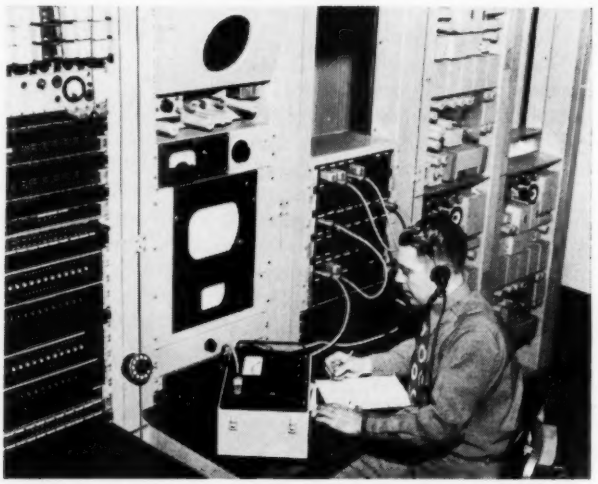
An important aspect of the service is the policy followed by the library in holding in strictest confidence the interest of a client in a particular subject, and the fact that a report has been prepared for him on a part of his company's development program.

The staff consists of research consultants and research assistants whose combined scientific training and industrial experience are equal to a wide range of technical problems. Subjects in which one or more members of the staff are especially qualified are mathematics, physics, nuclear physics, chemistry, biochemistry, geology, biology, pharmacology and pharmaceutical chemistry, dentistry, chemical engineering, food technology, metallurgy, economics, and industrial labor relations. And the language skills of the R. I. S. and reference staffs include German, French, Italian, Spanish, Czech, Russian, and the Scandinavian languages.

The R. I. S. is financed by two means. The first is by annual contributions from companies whose informational needs in research and development fall within the fields covered by The John Crerar Library. The contributions from the companies now participating in the program average approximately $1,000 per year and range as high as $5,000 per year. With only a few exceptions, the companies subscribing to the Service in 1947 (the initial year) assured their contributions through the experimental three-year period to include 1948 and 1949. Some twenty-five major firms are contributors at present.

The second means of support is by reimbursement to the library of the costs resulting from special library research services performed for companies and individual research men. This latter method represents a recent extension of provisions presented in the contract which the library has with the Atomic Energy Commission for abstracting current scientific literature. It enables the library to carry out library research projects which would not be possible within the limits of the library's normal income.

Looking toward Milwaukee, the giant microwave radio relay transmits television programs to Lake Zurich from the top of the Franklin Building in Chicago. There the impulses are picked up by a relay tower, and sent on to Milwaukee.



Nerve center for I.B.T. communication network carrying television is located at the Franklin Building in Chicago. Here programs are monitored and switched to originating studios. Photos, courtesy Illinois Bell Telephone Co.

Kukla, Fran & Ollie

(*Continued from Page* 10)

world today is the Englishman, Walter Wilkinson. "In 1947 we brought Burr to St. Louis for the American Puppeteers' Annual Festival," says Kukla, "and we put on a show for him. All the best puppeteers in the world were there. After the show everyone in the auditorium stood up and gave us a great ovation. We heard people come up to the platform and tell Burr that they had just seen the best exhibition of puppetry they had ever watched—better even than Walter Wilkinson. Burr won't admit it, but we know that was the greatest thrill of his life."

Fran Allison and Burr's meeting was a happy meeting of the minds. They both have the same ideas of entertainment, humor and all of the other ingredients that make Kukla, Fran and Ollie the wonderful show that it is. They had, when they began working together, no preconceived notions of what the show would consist of, and by sitting down before each show and discussing a few ideas they form the program.

The show goes on before the camera without a studio audience. Because of the equipment it is nearly impossible for people to see the puppets in action. Burr feels too, that it is impossible to present a good show for both a video and a live audience.

To Discuss Europe's Industrial Progress For I. I. T. Students

At a meeting sponsored by the Student Branch of WSE, the students of Illinois Institute of Technology will receive timely and interesting information on European recovery and American foreign aid from Mr. A. G. Bryant, President of Bryant Machinery and Engineering Company. The talk will be given at 1 p.m. on February 15, 1949 at the Tech Auditorium, 3300 So. Federal Street.

Mr. Bryant, in the capacity of President of the National Machine Tool Builders Association, represented that society in an investigation of the recent progress in European industry. With the accord of Paul Hoffman of the ERP, Mr. Bryant has talked with leaders of European business and industry about the effects of the Marshall Plan, and has studied the industrial methods used in Europe in comparison with our own methods of mass production. These topics, plus numerous interesting observations during his visit, will be discussed by Mr. Bryant.

As chairman of the Government Relations Committee of the NMTBA, Mr. Bryant has an accurate perspective of the foreign aid policies of the Congress and White House, and will have latest information on Senate Foreign Affairs Committee activities, with a purely objective viewpoint.

Canons of Ethics

At a recent meeting of the Board of Direction, the Canons of Ethics for Engineers as formulated by the Engineers' Council for Professional Development, was adopted.

Among the national societies which have already adopted the Canons are:

American Institute of Consulting Engineers, American Institute of Electrical Engineers, American Institute of Industrial Engineers, American Society of Civil Engineers, American Society for Engineering Education, American Society of Mechanical Engineers, as well as many local organizations in various cities and states.

The complete Canons of Ethics will be published in the 1948-1949 YEAR BOOK of Western Society.

Pullman Production

Pullman-Standard Car Manufacturing Company's delivery of 21,464 freight cars to the nation's railroads during the first nine months of 1948 exceeded by 5,023 the cars delivered in all of 1947 and was greater, with one exception, than in any full year since 1930, Wallace N. Barker, executive vice-president, has announced.

Barker attributed Pullman-Standard's increase in the building of freight cars this year to the long production runs that can be accomplished, given adequate orders, in a commercial car shop and also to a standardized product — the PS-1 — an all-welded "package" box car which was introduced to the railroads in June, 1947.

"As this car is built of component parts mainly engineered and manufactured in our own shops, standardization has made it possible for us to extend our application of mass production techniques both in fabrication and assembly," Barker said.

WSE Treasurer

Donald N. Becker

Donald N. Becker, Chief Structural Engineer with A. J. Boynton and Company, has been elected Treasurer of the Western Society of Engineers, 84 E. Randolph Street, Chicago. He succeeds Milton P. Vore, Jr. who died October 20, 1948.

Mr. Becker was Engineer of Bridge Design with the Division of Bridges and Viaducts, City of Chicago, from 1924 until he joined the firm of A. J. Boynton and Company in 1948.

Mr. Becker has been a member of the Society since 1920, and served on the Board of Direction from 1943 to 1946.

All members are looking forward to the formal opening of Western Society's new headquarters at 84 East Randolph Street, on which so many have been working for the past year. Watch for future announcements—and if you want to work on the committee let the office know by phoning RA 6—1736.

WSE Nominating Committee Is Named

To the Corporate Members:

I am pleased to announce that in accordance with Article X, Section 3, of the Constitution, the Board of Direction has appointed a Nominating Committee as follows:

Fred T. Whiting, 20 N. Wacker Drive.
Herman M. Ross, 332 S. Michigan Ave.
Albert P. Boysen, 208 S. LaSalle St.
Arthur W. Howson, 20 N. Wacker Drive.
James D. Cunningham, 2240 Diversey Ave.
Julius L. Hecht, 72 W. Adams Street.
George L. Jackson, 20 N. Wacker Drive.

The Constitution also provides that suggestions for nominees shall be solicited in the publications of the Society.

DONALD V. STEGER
Executive Secretary

Tear Off and Return

To the Nominating Committee, W.S.E.

I suggest the following names for consideration by your committee for offices indicated:

Officers and Trustees

President .....
1st Vice Pres. .....
2nd Vice Pres. .....
Treasurer .....
Trustees (two to be nominated) .....

Members of Washington Award Commission

Past Pres. of W.S.E. .....
Member not a Past Pres. or at present a member of the Board or candidate therefore .....

Signed .....
Address .....
Date .....

Western Society Calendar

Every Monday night is Western Society night at the new WSE headquarters, 84 E. Randolph Street. Members are urged to make it a must on their weekly schedules. Programs begin at 7 p.m., with a rendezvous dinner at the Blackhawk Restaurant at 5:30 p.m. Reservations for dinner should reach Mrs. Brown, Ra 6—1736 by the Friday before each meeting.

The meetings of all Sections and Divisions and of the Civic Committee, for the remainder of the year are as follows:

January 10	General meeting sponsored by Electrical Engineering and Communications Engineering Sections
January 13	Professional Women's Council
January 17	Traffic Engineering and City Planning Section
January 20	Civic Committee
January 24	Transportation Engineering Section
January 31	Bridge and Structural Section
February 3	Junior Division, Charles Ellet Papers
February 7	Fire Protection and Safety Engineering Section
February 9	Professional Women's Council
February 10	Civic Committee
February 14	Electrical Engineering Section
February 21	General meeting
February 28	Communications Engineering Section
March 3	Junior Division
March 7	Gas, Fuels and Combustion Engineering Section
March 9	Professional Women's Council
March 10	Civic Committee
March 14	General meeting sponsored by Bridge and Structural Engineering and Transportation Engineering Section
March 21	Chemical and Metallurgical Engineering Section
March 28	Mechanical Engineering Section
March 31	Civic Committee
April 4	Hydraulic, Sanitary and Municipal Engineering
April 7	Junior Division
April 11	General Meeting sponsored by Chemical and Metallurgical Engineering and Gas, Fuels and Combustion Engineering Sections
April 13	Professional Women's Council
April 18	Traffic Engineering and City Planning Section
April 21	Civic Committee
April 25	Transportation Engineering Section
May 2	Fire Protection and Safety Engineering Section
May 9	Junior Division, General Social Meeting
May 11	Professional Women's Council
May (date open)	Civic Committee, Dinner meeting
June 6	Annual meeting

Allis-Chalmers Excursion

Are you interested in a tour through the Allis-Chalmers plant in Milwaukee? If so, the Arrangements Committee would like to hear from you via postcard, and if enough members would like to see the plant, such a tour will be arranged. Please send your name on a postcard to WSE headquarters, 84 E. Randolph Street.

Consumer Credit Role

What is the nature of consumer credit? What is its role in the functioning of our economy? Is its present record-breaking level too high? Would further increase prove beneficial or harmful?

Such questions as these will be discussed by Ernst A. Dauer, Director of Consumer Studies, Household Finance Corporation, at a dinner meeting of the Chicago Chapter, American Statistical Association, January 18th, in the Stevens Building Restaurant at 6:15 p.m. The title of his paper is, "Consumer Credit—the Long View and the Short View." WSE members are invited.

A. I. E. E. Educational Program

The A.I.E.E., Chicago Section, is sponsoring an Engineering Educational Program in which members of all organizations of the Illinois Engineering Council are eligible to enroll in all classes at the member fee.

Courses already started are "Basic Principles of Supervision" and "Engineering Report Writing." Under consideration to begin in early spring are the following courses:

1. **FUNDAMENTALS AND CONCEPTS OF LAW**
   Includes engineering applications. The Chicago Bar Association is cooperating in planning this course. 5 Sessions—fee approximately $6.00.
2. **THEORY AND PRACTICE OF CONDUCTING MEETINGS**
   A course in planning and directing conferences and meetings. 6 Sessions—fee approximately $7.00.

If you are interested—fill in the space below, NOW, and mail to:

MR. H. R. HECKENDORN
Western Electric Company
Hawthorne Station
Chicago 23, Illinois

I am interested in taking the course(s) (1).....

(2)..... Other suggested subjects.....

Name..... Address.....

Western Society Meetings

General Meeting, January 10

Dr. Mervin J. Kelly, Executive Vice President of the Bell Telephone Laboratories, will speak before the General Meeting of the Society, sponsored by the ELECTRICAL ENGINEERING AND COMMUNICATIONS ENGINEERING SECTIONS, JANUARY 10, at 7 p.m.

The speaker has chosen as his subject, "Organized Creative Technology," believing it to be the dominant force in our present day society. Its contributions, organization and methods will be described. He will use examples from his experience at the Bell Telephone Laboratories for illustration.

Dr. Kelly earned his Ph.D. at the University of Chicago in 1918, received the D.Eng. at the University of Missouri in 1936 and the D.Sc. at University of Kentucky in 1946. He is a member of the National Academy of Sciences, and a Fellow of the American Physical Society, American Acoustical Society, Institute of Radio Engineers, and the American Institute of Electrical Engineers.

He has been associated with the Bell System Research and Development activities since 1918. He was Research Physicist from 1918 to 1933, and Director of Research and Development of Electronics and Transmission Instruments from 1933 to 1936. From 1936 to 1944 he was Director of Research of Bell Telephone Laboratories, and has been Executive Vice President since 1944.

Bridge and Structural, January 31

C. H. Sandberg, Assistant Bridge Engineer of the Atchison, Topeka, and Santa Fe Railway Company, will speak before the BRIDGE AND STRUCTURAL SECTION meeting JANUARY 31 at 7 p.m. at WSE headquarters.

His subject will be "The Construction of the Atchison Topeka and Santa Fe Railway Company's steel arch bridge over Canyon Diablo, Arizona.

Mr. Sandberg graduated from the University of Minnesota in 1926, joined the Bridge Department of A. T. and S. F. in the same year. He received his Master's Degree from the University of Minnesota in 1929.

In addition, a 16mm. movie, "Unfinished Business," sponsored by U. S. Steel Corporation, will be shown. The film depicts the opportunities in the steel industry as seen through the eyes of a returning veteran, and includes many facets of the industry. It has been shown in local theaters, but this will be its first private showing.

Traffic, City Planning, January 17

Mr. Harry C. Coons, Deputy Commissioner-Chief Engineer of the Michigan State Highway Department, will speak before the TRAFFIC ENGINEERING AND CITY PLANNING SECTION on Monday, January 17 at 7 p.m. in the WSE headquarters. His subject will be "Planning and Constructing the Detroit Expressways."

He will describe the many studies involved in the planning of these super-highways, such as: studies of traffic, zoning, off-street parking, mass transportation and kindred subjects. There will be slides and pictures of design and construction.

Mr. Coons graduated from the University of Michigan in 1916 with a Bachelor of Civil Engineering degree. He received his Masters degree in 1917. He was associated with several road commissions as County Road Engineer, and was Paving and Bridge Contractor for eleven years. For the past eighteen years he has been with the Michigan State Highway Department, the last fifteen as Deputy Commissioner-Chief Engineer.

Transportation, January 24

Robert S. Henry, Vice President of the Association of American Railroads, will speak on the subject, "Railroad Progress in Practice," before a meeting of the TRANSPORTATION SECTION, January 24, at 7 p.m. The meeting will begin at 7 p.m.

Airport Excursion, January 15

An excursion to Municipal Airport is one of the highlights of Western Society's calendar for January. Saturday afternoon, January 15 is the date.

Members will see the airline's new planes, and the Air Traffic Center. If the weather is good, small groups will be permitted to visit the tower where the radar equipment for landing planes is located. Luncheon may be obtained at the restaurant in the airfield depot.

We will meet at 2 p.m. at the hangars and office of United Air Lines, 6000 So. Cicero Ave.

Please make a note of the date on your calendar.

The tour is being arranged through the courtesy of Oscar E. Hewett, Commissioner of Public Works. C. C. Bowers, Chairman, Committee on Arrangements and Excursions, who made the plans, says "we hope for a representative turnout, including officials of the Society."

WSE Applications

In accordance with the By-laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Junior, Member, Associate, etc.

All applicants must meet the highest standards of character and professionalism in order to qualify for admission, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office.

Applications PRESENTED to the Board of Direction at its meeting held December 23, 1948.

135-80 Homer R. Soyster, 8223 Ridgeland Ave., attending Illinois Institute of Technology.

136-80 Samuel R. Price, Jr., Sales Engr., Ingersoll-Rand Company, 400 W. Madison St.

137-80 Joseph H. Skelton, Mech. Engr., Vern E. Alden Co., 120 S. LaSalle St.

138-80 Evan E. Olmstead, Specifications & Compliance Engr., Chicago Transit Authority, 79 W. Monroe St.

139-80 Theodore I. Przysiecki, Chief of Design Dept., Teletype Corp., 1400 Wrightwood Ave.

140-80 Harry Zditosky, 10148 S. Vernon Ave., attending Illinois Institute of Technology.

141-80 Eugene R. Stanley, 715 Pleasant Ave., Glen Ellyn, Ill., attending Illinois Institute of Technology.

142-80 George F. Kovar, 6411 W. 27th St., Berwyn, Ill., attending Illinois Institute of Technology.

143-80 Joseph A. Besal, Asst., Chief Engr., The Celotex Corp., 120 S. LaSalle St.

144-80 Carl G. Muench, Vice Pres., The Celotex Corp., 120 S. LaSalle St.

145-80 George H. Burt, Chief Engr., The Celotex Corp., 120 S. LaSalle St.

146-80 Gilbert A. Stevens, Plant Engr., American Stove Company, Harvey, Ill.

147-80 Norman H. Morrow, 610 N. Lockwood Ave., attending Illinois Institute of Technology.

148-80 Carleton B. Kidney, Turbine & Blower Specialist, Ingersoll-Rand Co., 400 W. Madison St.

149-80 Oliver L. Landry, Jr., 6139 Indiana Ave., attending Illinois Institute of Technology.

150-80 Robert J. Pinske, 3059 W. Jackson Blvd., attending Illinois Institute of Technology.

151-80 Joseph H. Ringhofer, 6948 S. Wolcott Ave., attending Illinois Institute of Technology.

List of Advertisers

Book Reviews

On Subjects of Interest to Engineers

Railroading from the Rear End

by S. Kip Farrington, Jr., published by Coward McCann, Inc., New York, 1946, 430 pp, $5.00

In the author of this book we have the combination of a skilled story teller who, at the same time, is probably better posted on railroad practices than any other man not directly employed in the transportation industry. The result is a romantic account of railroading, richly furnished with the latest engineering and technical data.

As implied by the title, much of the book deals with the movement of trains, passenger and freight, under the most severe conditions of weather, climate, grades and curves, with heavy loading and high speeds. But a broader coverage includes the latest design data of locomotives and cars and numerous types of special equipment. In effect, the reader is taken for a journey over the principal railroad systems of the country, learning something of the history of each railroad, the geographical nature of its territory, together with the principal products shipped and the characteristics of the people.

It is evident that engineers of these operating companies have contributed towards the technical data pertaining to recent outstanding developments associated with their respective properties. Of interest are chapters devoted to general communication, inductive train communication, centralized traffic control, progress in track building and maintenance, streamlined trains, vista-dome cars, Diesel-electric and steam locomotive trends, roller bearings, testing, special apparatus and similar subjects, which are worked up in considerable detail. In fact, it is unusual to find so much useful data in a book intended primarily for entertainment.

The fact that a notation in the volume being reviewed reads, "presented by the Baltimore and Ohio Railroad Company to the Western Society of Engineers' Library," implies an excellent recommendation.

E. B.
Member WSE

Poetry in Mathematics and Other Essays

by David Eugene Smith, published by Yeshiva College, New York City, 1947, 90 pp, $1.25

This collection of essays consists of a selection of articles published at various times in the American Mathematical Monthly, the Scripta Mathematica, and the Mathematics Teacher.

One essay expresses the parallelism of mathematics and poetry in having several common characteristics. Thus, precision in mathematics corresponds with the meter in poetry. Again, each says the most in fewer words than any other means of expression. Each has unlimited possibilities of invention. Each offers contact with the infinite.

Another essay tells of Thomas Jefferson's interest in, and knowledge of mathematics and astronomy. Another gives an account of Gaspard Monge, a French politician, who was also a mathematician, and who did a great deal in developing descriptive geometry.

This little book offers a diversion for those who desire to get a different viewpoint of the subject of mathematics.

H. F. W.
Member WSE

Radar Aids to Navigation

edited by John S. Hall, published by McGraw-Hill Book Company, New York, N. Y., 1947, 389 pp, $5.00

This is the second volume in the Radiation Laboratory Series of the Massachusetts Institute of Technology.

Four of the chapters have been written for the reader with no technical background. The remainder of the book completes the subject with terminology within the range of the average engineer. On the whole the subject is comprehensively covered and makes interesting reading.

Shipborne, airborne and ground based radar are thoroughly described along with their possibilities and limitations. A chapter is devoted to non-radar navigational systems which compare to or complement radar systems.

J. A. S.
Member WSE

Engineering Societies Personnel Service

84 East Randolph St., Chicago 1, Ill., ST ate 2—2748

These items are from information furnished by the Engineering Societies Personnel Service, Inc., Chicago. This SERVICE, operated on a co-operative, non-profit basis, is sponsored by the Western Society of Engineers and the national societies of Civil, Electrical, Mechanical and Mining and Metallurgical Engineers. Apply to ESPS, Chicago and the key number indicated, including postage to cover forwarding and return of application. If placed in a position as a result of a Men Available or Position Available advertisement, applicants agree to pay the established placement fee. These rates are available on request and are sufficient to maintain an effective non-profit personnel service. Prepared MEN AVAILABLE advertisements limited to 35 words, with typed resume attached may be submitted to ESPS Chicago by members of Western Society of Engineers at no charge. A weekly bulletin of positions open is available to subscribers. Apply ESPS Chicago.

MEN AVAILABLE

STRUCTURAL ENGINEER, licensed, C.E., 39, 15 years' experience airfield, bridge, tunnel, hydraulics; steam power, steel, concrete rigid frame, foundation, stack, caisson cofferdam; Industrial, architectural, mining, tipples, conveyors, coal stations; Distilleries, drying, evaporator, bottling, docks, elevators, pump houses. For consultant and constructor and industry. Now employed. Chicago area preferred. 17-W

DRAFTSMAN, DESIGNER-CHECKER, M.E., 23 years' experience foundry equipment, tractor farm machinery, bearings; layout, detail, check, inspect, calculate gearing, loads and stresses on complete assembly, jigs, fixtures, tools and drawings in engineering department and shop. For equipment manufacturer. Now employed. Chicago preferred. 18-W

DESIGNER, M.E., 39, 13 years' experience steel mill layout and equipment; foundry equipment; overhead travelling cranes; Diesel engine parts. For consultant, industry, equipment manufacturer. Chicago preferred. 19-W

CONSTRUCTION ENGINEER AND SUPERINTENDENT, C.E., 39, 17 years' experience letting sub-contracts, purchase, estimate, expedite, co-ordinate, supervise field office; Research, test, edit, provide construction information to architects, engineers, contractors and public officials; association chief engineer, codes, editorial, technical inquiries, supervised industrial and commercial construction. For contractor, manufacturer association, equipment manufacturer and commercial company. Midwest preferred. 20-W

RECENT GRADUATE, M.E., 25, 2 years' experience machinist apprentice, tool sales, interest in production, industrial management, sales engineering. Chicago preferred. 21-W

(39) DESIGNERS, DRAFTSMEN, DETAILERS, CHECKERS (mechanical, civil, electrical, mining), graduate engineers, from recent graduates to 30 years' experience for consultants, constructors, engineers, industrials, manufacturers and commercial on structures, equipment devices, machines and supplies. Employed and not employed. Chicago, Midwest, U.S. or foreign location preferred. $3000-$8500. 22-W

(3) ESTIMATORS (mechanical, civil, electrical), graduate engineers, several years' to extensive experience for construction, engineering, industrial and manufacturing on structural, commercial and industrial projects. Now available for Chicago area or Midwest. $3600-$6000. 23-W

(7) SPECIFICATION WRITERS (mechanical), several years' experience on machinery. Available for Chicago. $5000-$6000. 24-W

(14) CONSTRUCTION SUPERINTENDENT, or PROJECT ENGINEERS (civil engineers) 5 to 35 years' experience on construction, heavy, medium and light; industrial, commercial, airfield, pipe line, power house, utilities, water front, etc., Chicago, Midwest, U.S. or foreign location preferred. $5000-$12,000. 25-W

(3) JUNIOR CONSTRUCTION ENGINEERS, ASSIST. and SUPERINTENDENTS, OFFICE ENGINEERS, (civil engineers) recent graduates to 10 years' experience on construction projects. Chicago area or Midwest preferred. $3000-$6000. 26-W

(12) FACTORY OR PLANT MANAGERS, PLANT SUPERINTENDENTS, 10-30 years' line and staff experience in complete operation on light, medium, heavy production of equipment, machinery, devices, supplies, products and materials; Methods, process, maintenance, planning, scheduling, control, layout, tooling, management and industrial engineering. Available now for Chicago, Midwest or other locations. $6000-$15,000. 27-W

(33) CHIEF ENGINEERS, PROJECT AND PRODUCT ENGINEERS, 5-25 years' experience in complete engineering and shop operation of design, development, research, testing and production of light to heavy machinery, materials, equipment products and devices; controls, schedules, plans, tool, management. Now available for Chicago, Midwest or other locations. $5500-$10,000. 28-W

(7) PRODUCTION ENGINEERS, 2-20 years' experience in shop or plant planning, scheduling, controlling and laying out for light to heavy manufacturing and processing of machines, products, devices and equipment. Now available for Chicago or other locations. $3600-$5500. 29-W

14 MAINTENANCE ENGINEERS, MASTER MECHANICS, PLANT ENGINEERS, graduate M.E. or E.E., 5 to 30 years' practical experience maintenance of industrial, manufacturing, process and production plants on metals, wood, plastics, assembly and process and buildings. Installation, erection, (mechanical), repair, service, upkeep and preventive maintenance. Available for Chicago, Midwest or other locations. $4500-$7000. 30-W

1 METHODS AND PROCESS ENGINEER, M.E., 10 years' development for medium sized metals working shop. Now available for Chicago area. $5500-$6500. 31-W

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SALES ENGINEER (Technical ADVISOR) graduate M.E., 2-3 years' experience detail, design, installation construction industrial power piping; knowledge expansion joints, bellows. Handle technical inquiries for sales; advance to sales. $325-$400. Chicago area. R-5393

CHIEF DRAFTSMAN, experience detailing, layout design of pressure vessels small to 36" tank and related equipment, pumps, motors, electrical. Experience in tank construction, steel fabrication, machinery design and processing plants accepted. Engage in actual drafting and supervision of 3 draftsmen of pressure filters for a manufacturer. $75-$100 week. Location: Chicago area. R-5390

DRAFTSMAN, structural, mechanical, considerable layout buildings, pipe lines, power plant, electrical, other services. Experience related to shaft mining or potash mine desirable, not essential. Will reduce proposed alterations and new construction to drawings. $80 to $100 week. Location: New Mexico. Duration, 1 year. R-5388

QUALITY CONTROL MANAGER, graduate M.E., 28-35, experienced statistical quality control in metal stampings or allied. Will consider experience machine shop or light manufacturing. Knowledge of tool room, machine shop and stamping, punches, dies and inspection tools. Supervise 3 quality controllers, and other inspectors, formulate, maintain plan for quality control, recommend equipment for inspection and quality control, establish and follow program for maintenance of equipment, develop and operate training program. Maintain current knowledge of development in quality control. $4800. Location: Chicago. R-5385

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> (38) MIDWEST ENGINEER—The Western Society of Engineers, 84 E. Randolph St., Chicago 1, Ill. Society Publication, Vol. 1, No. 1. Monthly (except June, July and August) magazine containing articles on different phases of engineering development and industrial progress.

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